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PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND
MONTHLY RECORD OF GEOGRAPHY.



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* From the beginning of 1893 certain changes will be made in the fees payable; these will be duly announced.

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PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

A Journey across the Pamir from North to South.

By ST. GEORGE LITLEDALE.

(Read at the Evening Meeting, November 23rd, 1891.)

Map, p. 68.

MRS. LITLEDALE and I left England on Thursday, 11th April, 1890, and reached Odessa on the 17th, at 11 a.m. As the Batoum steamer sailed at three that afternoon, there was barely time for us to purchase some supplies which our previous journeys had taught us could not be obtained further on. At the hotel we found our interpreter, who had come from St. Petersburg, where he had been engaged for me by the kindness of Mr. Eliot, one of the secretaries at the Embassy. When a very dapper young man, with an immaculate shirt-collar and white satin tie, accosted me, and stated that he was the interpreter, my heart sank. How could I expect such a dandy to rough it in such a trip as ours? But he was very quick, and by his aid we got our purchases on to the s.s. *Tzarevna* with a little time to spare. Mr. Stevens, our genial vice-consul, came to see us off, and as the steamer was leaving the wharf he shouted, "Why did you not ask me to find you an interpreter? I have a capital man, a Persian." That was the very man we wanted. I had only time to reply, "Send him by next steamer—will wait," and off we went.

On landing at Batoum I inquired for the agent to whom I had consigned my heavy baggage, which came out by direct steamer. His office had been burnt down a day or two previously, but the luggage, fortunately, was still at the Custom-house. A reward made the natives scratch among the ashes, and four out of my five keys were discovered, the missing key being the only one of no consequence—which is contrary to all precedent! Then came the task of getting my guns, tents, &c., through the custom-house; having come by cargo steamer they were entered on the bill of lading, and as guns and ammunition are strictly forbidden to be brought into the country as freight, I was in a great fix. In vain I produced a letter to the Batoum Customs officials, which

Monsieur de Stael, the Russian Ambassador, had courteously given me, in which he stated that I was going on a scientific journey with the knowledge and consent of the Russian Government, specifying the number of rifles and quantity of ammunition, and requesting that I might be allowed to pass without delay; but it was of no use. They said if I had only brought the things with me as *personal luggage* I should not have been detained five minutes. I was treated all through with the utmost courtesy, but red tape, of which we know something in this country, flourishes in Russia to an extent of which the average Briton has no conception, and it was only on the fifth day, thanks to the efforts of Mr. Peacock, our most obliging consul, who telegraphed to St. Petersburg, and invoked the aid of the Embassy, that I got through at last, and without any duty; but the Customs sealed up all the boxes and gave me a letter to the Chief of the Customs at Usunada, in which he was instructed to remove all the seals immediately on production of this letter, and further informed that they had received special instructions from St. Petersburg that I was on no account to be delayed.

To finish the story of my troubles on this subject, on reaching Usunada, the Chief was away. His deputy said the letter declared there was to be no delay, but he had received no confirmation of it: the letter of advice had not arrived by the steamer: he had no doubt it would come by the next, and the moment it did he would remove the seals, &c. The next steamer, I may mention, was not due for two days. One learns not only to be patient, but also wily when travelling in the East, so, with the aid of an obliging officer of the Russian Guards, with whom we had made friends in a quiet way, we thoroughly scared the official who refused to take off the seals, and then set to work to interview every likely and unlikely functionary. At last we unearthed one, who, after a brief consultation with our friend, tore off the seals, and we were free.

The Persian interpreter, promised by Mr. Stevens, came by the next steamer from Odessa, and joined me at Batoum. He had travelled extensively in the East with Dr. Linsdell, Mackenzie Wallace, and others, and I was especially glad to get him, as I knew we should want a Persian interpreter when we got among the Tadjik in Badakshan, and I did not feel at all sure I should find one who would trust himself to the tender mercy of the Afghans.

I left Batoum by train on 26th April and rejoined Mrs. Littledale at Tiflis. I had sent her away from Batoum to avoid the chance of her catching fever at that most unhealthy place, though since the Russians have prohibited rice being grown near the town, as it was during the Turkish occupation, there has been a marked decrease in the amount of fever. We stayed a couple of days in Tiflis, where we bought every dried ox tongue we could lay our hands upon, some forty odd. They are very portable, and made a delightful change from the

inevitable mutton we had to live upon later on. On approaching the Caspian the Baku line passes within a mile or two of the oil-town; the derricks over the wells look in the distance like great black sugar-loaves. On arrival we drove straight to the steamer, but had to go to an hotel for the night. The steamer was clean and comfortable; she was built by Samuda, in London, eight-and-twenty years ago, and was brought through the canals in two pieces. When she burnt coal it cost about nine roubles, or about 22s. an hour; now she burns oil, using 30 poods an hour, at a cost of 2s., besides having only six men for engines and boilers in place of 15 or 16.

We had a smooth passage across the Caspian, and arrived about 11 a.m. at Usunada, where we were met by an officer sent by Colonel Andrieff, who was acting head of the Transcaspian Railway during General Annenkoff's absence. This officer told us that a special carriage had been set apart for us, and would be at our disposal till we reached Samarkand. Colonel Andrieff dined with us on the steamer, and as he was travelling by the same train we did not hurry over that meal, for we knew they would not go without him. We had the whole carriage to ourselves and arranged one compartment as a bedroom, with our camp mattresses on the top of air-beds, which we had brought for the tarantass work later on, and with pillows we made ourselves really comfortable. The weather was delightful—just warm enough. The whole railway journey was a great contrast to the one we had made a couple of years before, when the line was only just open and everything was in disorder. There was a dining car on the train, and we had as good food as one might reasonably expect in that part of the world. From the Caspian to Samarkand it is one long plain, with only slight undulations here and there; consequently there are no cuttings or embankments, hence the cheapness with which the line was constructed. But although inexpensive, in the first instance, there are sections of it that must be costly in the extreme to keep in working order.

From Merv to the Oxus, and over a shorter stretch from the east bank of the Oxus towards Bokhara, and another to the eastward of Usunada, the line has been carried through howling wastes of drifting yellow sand, having all the appearance of a strong sea with its waves and billows, which some magician has changed to motionless sand; but the stillness is not real, for if you watch the top of the crests of the wavy hills you will notice that even a light breeze causes the moistureless powdery sand to blow over the top of the crests down on their lee-side, thus moving the sand-hill slowly but gradually forward; and it is these restless sand waves that constituted the main difficulty in constructing and keeping open the Transcaspian Railway. The people employed in making the line had evidently been allowed to cut down any shrub they could find for fire-wood, consequently, there is a strip on

each side of the railway a quarter of a mile in width without any vegetation to help to hold in check the shifting sand.

From Samarkand to Marghilan, the Russian capital of Kokhand, the road passes through a stretch of barren country alternating with veritable gardens of Eden, which support a large population. To the south extends a long range of snow mountains, peak after peak, some of them nearly 18,000 feet high, though the general run are about 12,000 or 14,000 feet. This range forms at its eastern end the watershed between the Alai Plateau and Kokhand, and joins the Tian Shan. The north side of the Kokhand valley is also bounded by snowy peaks which, though not so lofty or imposing, still help to form a panorama of exceeding beauty, and in the spring I was reminded strongly of the Vale of Kashmir.

Arriving at Marghilan on 14th May, we laid in a four or five months' supply of white flour for ourselves, and I purchased an English-made revolver, at famine price, for the interpreter, which revolver he managed to lose or have stolen from him a couple of hours after he got it. Directly we arrived, I set to work to try and find a Kirghiz named Azim, whom we had had as cook before, and by the aid of the police we found him. We were delighted at securing him, as he was by far the most intelligent man of his race that we ever came across.

Resisting the kind invitation of General Korolkoff, the Governor of Ferghana, to stay another day, we left Marghilan and arrived at Osh, 500 miles from Samarkand, the terminus of the post road.

We found a very convenient half-empty house, where we stayed the few days that it took collecting our party. The next step was to discover our old caravan bashi. He had bloomed into a more important personage, but he jumped at the idea of going with us; previously he had owned no horses himself, and simply went as caretaker of other people's animals, and in that capacity did excellently; now he had eight or ten horses of his own.

With the aid of Colonel Denlmer we soon made an arrangement with him, that we should hire eight horses from him, with two men, and that he should supply five extra horses without payment, in case of accidents, and two men to attend to them. We also purchased twelve horses, at an average price of 2*l.* 10*s.*

Owing to the absence of firewood on the Pamir we had baked two thousand biscuits about the size and shape of a man's fist, these were for the two interpreters and Azim the cook. We dried them in the sun, and they got as hard as stone, and would keep for any length of time.

I invested in a coat reaching down to my heels, cloth outside, sheepskin within, and a cap with a kind of curtain all round which made a cape over my shoulders, also of sheepskin. Mrs. Littledale had brought lots of wraps, but we had an extra lining of Khotan lambskin put into a cape of Harris cloth, which had already a thick wadding; it was heavy,

but she only wore it riding; it completely covered her and the saddle. She found it delightfully warm. We had cut down our personal baggage as much as possible; I had only a small trunk, which was principally filled with photographic things, aneroids, boiling-point thermometer, bird-stuffing tools, &c., and presents for natives. What we did not stint ourselves in was bedding, and we had each a waterproof canvas roll containing plenty of blankets, &c. I attribute the good health we have always enjoyed on our expeditions mainly to the fact that no matter how cold or wet the weather may have been, we have always had warm and dry beds at night. Our tent was ten feet square, American drill, with a dark-blue lining, and an outer fly with a porch. It weighed, without poles, 80 lb. Edgington made it to our own design seven years ago. We have used it every year since then, and it looks good for another seven years. If a tent is properly made in the first instance, and is never kept folded up for any length of time when wet, it will last for years, but if no trouble is taken a three months' trip will ruin a new one.

Our camp beds were very strong and serviceable, and most comfortable, weighing about 20 lb. apiece, made after the plan of the Indian charpoi, but lighter; a very thin tarpaulin ground sheet, which is lighter, more durable, and far cheaper than mackintosh, kept everything dry below. We had also a most ingenious folding stove, made in Canada, and recommended to me by a great sportsman, Mr. Otho Shaw. A folding chair, table and stool, and a small light carpet, completed the furniture. With tent, bedding, trunks, rifles, ammunition, tent poles, pegs, chair, and table, we had just three pony-loads between us.

For our interpreters and stores we had an A tent, about 13 feet long and 7 broad, made of light duck, waterproofed by the Willesden process.

My wife had, of course, brought her saddle from England, and had fixed a very strong deer and strap, to tie on cloaks, waterproofs, and a kind of saddle-bag to hold anything and everything. For the interpreter and myself I bought Kirghiz saddles, which are most uncomfortable till you get accustomed to them, and you have to ride almost entirely by balance, but after a few days I got used to it.

On our previous expedition we had found so much difficulty in getting the cooking done during the furious gale which almost daily swept over the Pamir, not only blowing the fires clean away but covering everything with sand, that we got a yurt from the Kirghiz for a kitchen. We then found that the thick felt was so much warmer than our tent, that we discarded the tent and used a yurt, stretching our tent over the top of the felt for extra warmth. We engaged two jigitas, who are a kind of unofficial policemen and watchmen, to come with us as a guard. They were both armed with guns, and agreed to turn their hands to anything.

On Thursday, 22nd May, we said farewell to Colonel and Mrs.

Deubner, who had been kindness itself, and had helped us in every sort of way, and started, a cavalcade of between twenty and thirty horses and eight men. I arranged that one interpreter and one jigit should always remain last, and follow behind the caravan, so that nothing could be stolen or tumble off without being seen. We left behind at Osh sufficient money to take us comfortably back to England, in case we had for any reason to return to Turkistan. On the road we met a Kirghiz judge, an old acquaintance, who said the snow was very deep on the Taldik Pass, and that we should not be able to get our horses over for at least ten days. Though up by daylight our men were slow, and we did not get off till eight o'clock. Langar was 5800 feet above the sea, and we had a couple of small passes to cross before reaching Gulcha, the first one 7400 feet, the second 6900 feet, above sea-level, and we skirted a small lake with lots of wild fowl, but the water was too horrible. On arriving within a few miles of Gulcha we were met by a Kirghiz, who said his chief was following; he was coming to escort us safely across the Gulcha river. Shortly after the chief arrived, wearing a magnificent silver belt given to him by the Amir of Bokhara, of which he was immensely proud, accompanied by fifteen or twenty Kirghiz, and he immediately ordered them to ride into the river to find out the best ford. A caravan from Kashgar passed; they had taken sixteen days coming. They had crossed by the Terek, and stated there was no snow on the pass. Some other Kirghiz stated that it would be quite useless to attempt to cross the Taldik for another fifteen or twenty days.

One of the difficulties of travelling in this part of the country is the almost impossibility of getting reliable information. Here was a caravan which had just crossed the Terek Pass, and the men reported that there was no snow on it at all. The pass is over 12,000 feet, and other Kirghiz stated that the Taldik, about 1000 feet lower, would not be possible for horses for a fortnight or three weeks. Our scheme was to follow up the Gulcha river, and then cross on to the Alai Plateau over the Little Alai range. There are two principal passes, the Taldik, 11,600 feet, and the Shart, 12,800 feet, which are closed during the winter months. But supposing I found it impossible on account of the snow to reach the Alai that way, then I proposed crossing by the Terek Pass, which is used in the winter by the caravans coming from Kashgar, who trample a road in the snow; and it is not considered a difficult pass till the spring, when the snow gets soft, and it then becomes impassable altogether till the snow is gone. As the Kirghiz said that we should not find any grass at the head of the valley, we thought it best to keep our caravan at Gulcha, and send on an interpreter with some Kirghiz to report on the actual state of the passes, otherwise we might have to make serious inroads into our supply of barley if all our horses were kept waiting at the foot of the passes for a fortnight.

I tried to hire a dozen horses belonging to the Kashgar caravan. The men in charge were very wild and picturesque, but with most villainous countenances, and if the face is any test as to a man's character these gentlemen were certainly murderers ready made, and although they were quite ready to come for the sum I offered, 40 kopeks a day, they wanted so much in advance that I thought it prudent to decline their services, as once south of the Alai, and on the Pamir, I should have nothing to depend upon but my own right arm, and they would almost certainly have deserted, taking the precious barley with them. So I sent one of the jiguits back with a note to Colonel Deubner at Osh, asking him to engage ten or a dozen horses, load them with as much barley as they could carry, and send them to Lake Kara-kol, where I would wait for them.

Gulcha is situated in a grassy valley, a couple of miles wide, with groves of timber. Up a valley to the north-west there is a beautiful view of some fine snowy peaks forming part of the chain of the Little Alai Mountains; there were a great many Kirghiz encamped in the valley waiting until the snow should melt on the higher ground, then they would gradually push on to the Alai Plateau.

We had to wait four days before the interpreter returned, and it rained almost incessantly. We bought as much barley as our caravan bashi said our horses could carry, then I bought some more and hired some Kirghiz horses to carry it to the foot of the Taldik Pass. I determined to have plenty of barley, as our chance of crossing the Pamir with our baggage depended as much upon our keeping our horses fat and strong as upon anything else.

On the 29th May, Joseph, our interpreter, returned, reporting that there was deep snow on the Taldik; the party forced their way to the summit, but they could not get down to the Alai, their horses sank into the snow; they then tried the Achat Davan, another pass a few miles east, but it was no better. The Kirghiz said it was hopeless to attempt the Shart Pass, which I quite believed, as it is higher and the track leads up a very precipitous valley on the north side, which would surely be choked with snow. We determined to start the next day and go up the valley to the point where the path over the Terek Pass branches off to the east, and see whether the Terek was open.

In the early morning of the 30th May the weather was threatening, so we did not get off till 7.40, and arrived at Kizil Kingan about noon, and pitched our tent close to the river. The road from Gulcha followed the river banks, crossing and recrossing by bridges made in the same manner as the bridges in Kashmir. Marching up the river, the scenery was very picturesque, every now and then up some side valley we got glimpses of snow-peaks; the path in one place rose high above the river, and passed round a rocky buttress overhanging the water, round which the horses were carefully led one by one to prevent their packs

catching the rock, and a possible accident ensuing; but before our horses reached Kashmir they would have laughed to scorn being led past a comparatively easy place like that. On the road we passed some jiguits, who were carrying despatches to the Russian consul at Kashgar. They had tried to cross the Terek Pass, and after a very bad time of it had to return, so we gave up all thoughts of the Terek.

At Suffi Kurgan it was 6700 feet, and perceptibly colder, and from there to Akbosaga was a long fatiguing march for the horses. The valley opens out, and is a mile or more in width, with here and there clumps of poplars in the river-bed, and pines higher up on the hill-side. We passed some fine peaks close to where a valley leads to the west to the Shart Pass.

We found two good yourts ready, the one for us being very large. We also met many acquaintances among the Kirghiz, our old hunter among the number. He was most anxious to come with us, so I said I would give the same wages as before, but they wanted me to feed them. I knew if I agreed to feed them no amount of food of all kinds would satisfy them, so I was firm on that point, though, practically, I should have to feed them, but as anything I chose to give would be a present, they could not grumble. Then we arranged for a couple of yourts, two men, and four horses to carry them, for one and a-half roubles a day, the men to find themselves. We also hired seven horses to carry firewood and barley for a few marches, and a flock of sheep was also added.

By the time these arrangements were completed a couple of days had melted away, for the Kirghiz are dilatory to a degree, and most exasperating. We insisted on seeing the yourts that we were to take with us before taking them, and by picking out the good new felts from our big yurt we thought we should be warmly housed. Placing a hunter as sentry over the felts and framework of the yourts, we packed up and started for Taldik.

The previous day a large caravan from Kashgar had passed over; they had tried to cross the Terek from the other side and failed, and had to make a six or seven days' detour round by this place. They reported not much snow.

We had been camped at an elevation of 9300 feet, and had to climb about 3000 feet to the top of the pass. The snow lay in patches, and we could undoubtedly have crossed without difficulty some days sooner. On the south side there were some places where we had trouble with the horses, owing to the drift. On the Alai Plateau we found no snow, though we skirted the edge of it all round. The Great Alai Mountains looked grand, appearing like one long wall of snow-clad peaks, running up to 22,000 or 23,000 feet. Seen across the twelve or fourteen miles of plateau, the air was so clear, they looked much nearer, and they stretched east and west as far as the eye could reach.

There seemed to be such masses of snow as to preclude all chance of our being able to cross them for a long time to come.

In the Kirghiz tongue Alai means paradise, but that is hardly an accurate description of the plain, for from the end of August till the middle of June, or nine months and a half, owing to the severity of its climate, it is quite uninhabited, and as we saw it on 3rd of June it looked very desolate; the ground was quite brown, the snow having only just melted, and, except marmots and some great bustard, not a living thing was in sight. There were no trees or bushes; the last we saw for many a long day were at Akbesaga, just before crossing the Taldik. Our camp at Katin Art had an elevation of 10,800 feet.

Next morning there was a general strike on the part of the Kirghiz with the yurts. They said they had received no money—their chief had apparently grabbed the whole of what I paid in advance—and they would not go any further, but saddled their horses and tried to go off. About three hours' incessant talking and negotiating put matters on a fresh basis, i. e. when they have worked off the money I advanced their chief I am to pay them every evening. They appeared to be contented with that. The Kirghiz are very exasperating in many ways, but as regards money they are so swindled and cheated by their own chiefs that they naturally think that every one else is a rogue.

We crossed the Alai Plateau, fording the Kizil Su, and camped two or three miles up the defile leading to the Kizil Art in a sheltered place where there was some good grazing. The Kirghiz carrying some of the firewood had agreed to come as far as we liked, provided they were paid daily. These gentlemen, directly they got their money, announced their intention of returning, and as they were a mischief-making lot I thought it best to let them go, retaining, however, a couple of their horses, the hire of which I was to pay to another of their tribe. Early next morning I started with some Kirghiz, taking lots of rope, in case of accidents, to see if the Kizil Art was passable, and to our astonishment, with the exception of the last 200 yards, there was absolutely no snow whatever. On getting down the other side we found hardly any grass at all, so on our return home we decided to leave the main body of the caravan camped where it was, under the charge of the Persian interpreter, while Mrs. Littledale and myself would go a couple of days' march to the valley, where I hoped to get some *Ovis Poli*, taking with us as few horses as possible in order to economise barley, as where we were going there would be probably nothing for the horses to eat. As soon as the new caravan with barley from Osh arrived they were to march to Lake Kara-kul where we hoped to join them.

In order to save the firewood we gave out only a small allowance every day, and had the faggots all piled up in front of our yurt so that no one could take any without being seen during the day, and our

Kirghiz puppy, who had turned out to be an invaluable watchdog, would certainly allow nobody near at night.

Our small caravan crossed the Kizil Art, 14,200 feet, without difficulty the following day, and camped at an elevation of about 13,600 feet on the Markan Su, whose waters find their way into the Kashgar river; there were little patches of grass here and there, but not much, and some root fuel.

We had rather a troublesome lot of men to manage; the young Russian told me that he suspected our Kirghiz cook of stealing a packet of tea. Not at all improbable, I thought, but I told Yudin that he was on no account to say anything to the cook as he was a very violent tempered man and would be certain to say he would leave, and he would have been a great and irreparable loss; for besides being the quickest cook we had ever had there was no possibility of replacing him, and further, he spoke Russian, and we had no other means of communicating with the Kirghiz except through our Persian, whose English was rather weak. So I was very much annoyed on going into the cooking yourt to be greeted by Azim saying that he wished to leave because Yudin had said he stole the tea; it took us quite an hour to soothe him, and at last he consented to stay, and then I gave Yudin a sharp scolding for having so little tact. Of course any one of them would steal, the only way was to keep the things locked up. Our valuable stores were carried in old tea-boxes made of thin wood, but having the sides dovetailed together they were both light and strong. I fixed leather hinges and a padlock on each.

Some men had brought some extra felts for the yourts and we made ourselves quite warm. I went out to see if I could find any *Ovis Poli* with a couple of hunters. The Kirghiz left in camp rolled the old hunter's dog up in a felt belonging to the yourt and sat on it till we were out of sight so that the dog should not miss his master; the dog howled, which was not surprising! On returning to camp the men said there was another man shooting *Ovis Poli*, his camp was close, and he was coming to see us, but they did not know his nationality beyond that he was not Russian. Presently up came Major Cumberland dressed in native costume; he had come from Kashgar and was on his way to Turkistan. We handed over to him all the books we could spare. Next morning he gave me a Ladak fur cap, which proved invaluable, being just as warm and a quarter the size and weight of my Kirghiz cap. We said good-bye, and he started over the Kizil Art Pass. Some of our horses had strayed, and when the men who were looking for them returned, they said they had found Major Cumberland miles out of the road, and had shown him the way over the pass. I have never met Cumberland since to inquire whether it was another Kirghiz yarn or not.

The missing horses not having turned up by nine we decided to start without them, leaving a couple of men and one horse behind to look for

them. As we were three horses short, I walked. Azim our cook could hardly be induced to ride whilst I was on foot, but after doing three-quarters of the way I made one of the yourt men walk, as he had chosen to sleep all night instead of looking after his horses. It was a long march, and being my first good walk, and what with the soft sand and the elevation, it was a fatiguing day, and the wind was bitter at times.

We had crossed into a valley that emptied itself into Lake Karakul with the hope of getting some *Ovis Poli*, while we were waiting for the caravan with the barley from Osh to join us. We did not have great sport, and I did not see anything very big in the way of sheep, but there were some magnificent snow-peaks, considerably over 20,000 feet; close to the lake was very weird scenery, and some of the side valleys were choked with glaciers.

This Central Asian scenery has a type of its own, quite different from the Swiss or Caucasian mountain scenes, where your eye when tired wanders from grand ice-fields above to a pleasant change of green pastures and then forests of pine below. Here, though the mountains are higher, the glaciers, owing to the small snowfall, are much more puny, while below there is a picture of utter desolation that would be hard to match in any other part of the world. The all but complete absence of vegetation gives a weird and uncanny character to the scenery of the valley in which we camped, which is called by the Kirghiz the Black Valley.

After a stay of four or five days we started for the Karakul; we timed it so exactly that though we had had no tidings since we sent a man back from Gulcha to Osh, that at the point where we joined the track leading to the lake we met the new caravan and the remainder of our party marching along. It was a very good calculation.

We crossed the Kichkine Kizil Art, 14,200 feet, which is a sandy flat watershed between the Markan Su and the Karakul. Owing to quicksands we had found it impossible to follow the valley to the lake, so we had to cross some high rough ground, making a considerable detour before we could get down to the lake. We had passed plenty of root fuel, but before we could find any water we had left the roots a good many miles behind, and all the water we could find was a stagnant alkali pool. There is water on the hills, which look quite close, but I knew from experience they are miles and miles away, so we had to make the best of it. From the top of the hill the lake looked beautiful, the water the bluest of the blue, and completely surrounded by snow mountains. Two peninsulas jut out, one from the north and the other from the south, and almost cut the lake in half.

One of the Kirghiz hunters was sick, and said he wished to return, and as he gave us the impression that he was suffering from some complaint akin to itch, we gladly let him go. He was an excellent hunter,

and only came for the love of sport, for owning as he did 1000 sheep, the small wages we gave could have been no attraction to him.

On the 7th June we broke up camp and marched along the east side of the Karakul Lake, rather heavy travelling, with a little grass at first but getting less and less. At Oksali Mazar, where we turned up a very weird valley, the rocks looking like walls of iron, with absolutely no vegetation, there was a cairn composed of *Ovis Poli* horns, some very fine ones among them. After a desperately long march we camped at Muskol, on the Ak Jilga river, where there was water and a little grass, but no fuel of any kind; the bottom of the valley, about 200 yards to a quarter of a mile in width, was for several miles 4 or 6 feet in snow, and then a valley branched off to the east to Rang Kul. There were a couple of yourts here belonging to Kirghiz, subjects of China. We marched up the valley towards the Tuyuk Pass, called by the Kirghiz the Ak baital davan, which we crossed on the second day; there was no snow on the summit, 15,525 feet by the aneroid; there was a little grass here and there, but not nearly enough for our horses, and we had to be liberal with the barley to keep up their strength.

The descent of the pass was extremely steep for 500 feet to the Ak baital river-bed, which we followed downstream. There was a very heavy snowstorm behind us, which we escaped, but we came in for a desperate gale, which tried the yourt very highly; one old hunter was the only man we had who really understood pitching a yourt properly. The constant use of alkali water began to tell upon us, and our skin got burnt outside with washing, and inside with drinking, and our throats got so sore that neither drinking nor tubbing could be largely indulged in.

We camped in an alkali swamp, about five miles W.S.W. of the junction of the Ak baital and the Murghab. There was plenty of coarse grass, but no fuel. We had a fine view of the Tagharma Peak, called by the Kirghiz Mustagh Atta—Father of Snow. It is stated to be between 25,000 and 26,000 feet high. The head man of a Kirghiz encampment came to see us. I asked if he could read Chinese. He said no; so it was a fine opportunity! I produced my Chinese passport, and enlarged to him the fearful pains and penalties he would incur if he failed to get me a reliable guide. He was apparently much impressed, and he left and returned with the smallest, thinnest, and most woe-begone lamb either of us ever set eyes on, some kounnis and cream, and in return we gave him a musical-box, needlebook, and some tea. Finding he was not satisfied, I added an extra fur-cap I had brought—as, although our presents were two or three times the value of his, we thought it prudent to get a character for liberality, otherwise the guide might not be forthcoming. We left with him a supply of barley, firewood, and stores, so that we might have something to fall back upon in case we had to return.

The Murghab, where we camped, was only 12,300 feet above sea-level; it was the lowest elevation we had been at since leaving the Alai, and would be till we arrived at Sarhad. From this point there were two routes by which we could travel: one by following the Murghab to the little Pamir lake down the Wakhan to Sarhad, the other by the Alichur and Great Pamir to Kala-i-Panj, and up the Wakhan river to Sarhad and the Baroghil; and we decided on the latter, as being by far the most interesting of the two. Before the Osh caravan left us we bought every horse-shoe and nail they could spare; for, though we had brought with us double the quantity of shoes the caravan bashi said was necessary, still I thought it prudent to be on the safe side. We also bought an extra horse, which was not a successful deal, as the beast ate the precious barley, and wore out shoes, and was never fit to carry much more than himself.

On 17th June, after one ineffectual attempt, we forded the Murghab, which was swarming with fish, apparently trout, and went up the valley of the Kara Su. Plenty of grass at first, which got less and less as we approached the summit of the Neza-tash, 14,200 feet, on which four valleys open out, and it is so flat that it is impossible to say when you are at the top. We camped 13,625 feet, about five miles down the Alichur at the junction of the Neza-tash and Bustin valleys; there was hardly a vestige of grass, but lots of root fuel; there was a very bitter wind blowing in our faces all the march, and we could obtain no shelter for the yurts which were exposed to the full blast. A man whom we had picked up temporarily as guide, said there was a way over the mountains to the Great Pamir Lake opposite our camp; but as we wished to pick up a better guide who was reported to be found lower down the Alichur, we decided to go on and cross by the Bashgumbaz Pass. We passed Chatirtash (stone house); it is a rock that stands up alone in the middle of the Alichur, and in the distance looks exactly like a house.

After a short but bitterly cold march, during which even our sheep-skin coats were unable to keep out the icy wind, we camped at the entrance of the Bashgumbaz valley, near some Kirghiz, who said the pass was blocked with snow, and baggage animals could not cross for a month. The most striking feature of the Alichur Pamir is the immense number of *Oris Poli* horns lying about; they are literally in hundreds, some of them very large.

Failing to cross the pass we had to go down the Alichur to Burzula Jai, which is close to where the Chinese frontier ends and the Afghan territory commences. The head of the Kirghiz told me he could not find us a guide, so I said I was very sorry, but until he got me a man he could not possibly leave us; that put a new complexion on affairs, and a man appeared in a couple of hours. I had my doubts and cross-questioned him, when he stated he could take me to any place except

heaven or hell; he turned out, however, to be a fraud, and lost his way a couple of days after leaving his yurt.

The horses were missing again this morning; it turns out that all the horses we have hired belong to two men, with the exception of one solitary animal which belongs to the third, all the wages which he gets being the hire of this horse. This man being poor the others bully him, and expect him to watch the horses all night alone, while they are curled up in their sheepskins. It is of course impossible that one man can walk all day and watch horses all night, consequently he goes to sleep and the beasts wander; being close to the frontier the chances of robbery are much greater, and if our horses were stolen we should be in a most serious condition. The men returned to camp to get some food, having found about fifteen of the thirty odd, and started again on a fresh hunt, when I found that, contrary to my express order, they had left their own horses in camp and had ridden out on our horses to look for the runaways. I was very angry and had all their horses saddled and sent every one of them out with Kirghiz on them to look for the runaways. They were all collected at last; the caravan people were very angry at their horses being used, and said they would return home, and absolutely refused to pack the horses. I stood some distance apart and beckoned the head of the caravan to come; he took no notice of me till I walked straight for him, when he saw I was not going to be trifled with, and he came. At first he was defiant and said they were all going back, so I told him that he was welcome to go but I had engaged their horses for as long as I liked, and I meant to keep them, and if they attempted to take them I would shoot every horse they had. I pointed out that if they returned to Turkistan and broke their contract they would certainly be put in prison; on the other hand, if they did their duty they would not only get their wages but a present as well. The storm died out as quickly as it had arisen, and anybody who had seen them in the evening feasting on a sheep I thought it politic to discover I did not want, would have never imagined they were the same people who were so infuriated in the morning. They were just like children, but firmness at first, and then conciliation, got over all our difficulties.

We passed within sight of Lake Yashil-Kul and turned up a valley named Kunday, where we camped. Next morning we had a steep climb up to 15,150 feet, and a very steep descent the other side, down to a lake, whose shore was white with salt, the old hunter collected a large bagful of it. The poor man was sick all the time, owing, as he said, to the elevation. It was a curious thing that several of the Kirghiz were ill, and they all attributed it to the height, while neither of the interpreters, Mrs. Littledale, or myself, were inconvenienced at all. On the top we found our precious guide had taken us up the wrong valley, and our climb had been for nothing; had we gone further on we should have avoided the hill altogether. We then had

a tiring ride to the Khargosh Pass, 14,550 feet, and down the other side to the Pamir river, a descent of six or seven miles. On my asking one of the Kirghiz if he was certain to find *Ovis Poli* on a particular range, he replied, you could not be sure, they had not got houses to live in. A very good answer, I thought.

It was about midway between the Victoria Lake and Kala-i-Panj where we struck the Pamir river, its width being about 100 yards, and near our camp quite unfordable. We determined to make a detour to the Victoria Lake on the great Pamir, shoot there a little, and then descend down the river to Kala-i-Panj and cross into Chitral by the Baroghil or other passes.

As we intended to return, we hid some of our firewood and barley under the rocks, as the Kirghiz horses that carried the yourts had been very much neglected, and their backs had been allowed to get into such a state, that we could not bear the idea of their carrying any loads; so as the weather was getting warmer, we decided to take the yourts as far as the Victoria Lake, and then pay the men and send them back. Having got rid of the barley and firewood, we used our own spare horses to carry the yourts.

The Kirghiz are absolutely callous to animal suffering, and one poor horse, whose back from their carelessness had been allowed to get into a fearful state, was thrown down while I was away shooting, and had great hunks of flesh cut from his back. It was a long march up to the Victoria Lake, 9½ hours, and in spite of her furs, Mrs. Littledale got very cold before the baggage arrived a couple of hours later.

We camped at the western end of the Victoria Lake (13,980 feet), called by the Kirghiz "Gaz Kul"—Goose Lake, I suppose from the number of Brahmin geese which frequent it. On the 27th June it was half covered with last winter's ice, in places from one to two feet thick. As we followed the Pamir river to the lake, the mountain to the south, dividing the Pamir from Wakhan, formed a magnificent sight; big glaciers and snow peaks running, I am sure, over 20,000 feet. There were the remains of old moraines right down to the river on both banks, but principally on the south; and far away to the south-west there was a very high triangular peak towering far above all other mountains. I think they must belong to the Hindu Kush. The view from our camp over the lake was very grand, but on ascending the slopes of the hills on the north side, the lake was very disappointing; it looked so narrow, like a canal, but the mountains came triumphantly out of the ordeal. They bear inspection well, but their icy slopes quite knocked on the head any idea I had of finding a pass across them direct to the foot of the Baroghil. Some Kirghiz I met on the Alichur stated that the grass grew so luxuriantly on the great Pamir, that unless we took care we should lose our horses, it being higher than their backs. I received that statement with the usual grain of salt, but I admit I was not

prepared for the utter barrenness we found at our first camp. Unless we had had barley there was certainly not enough grass to have kept them alive at the eastern end, but high up on the hills there was much more. Up to that moment this was the champion misstatement, but on reaching Badakshan the air so reeked with falsehood that a lie of only that dimension might have passed unnoticed! We had a bitter night, and the parts of the lake that were open water the previous evening were covered with a thin coating of ice in the morning.

Ali Bey, the guide that we had been promised, turned up to-day. He seemed to know the whole country well, but made a statement which to me was incomprehensible, namely, that during summer it was impossible to go from Kala-i-Panj up the Wakhan river to Sarhad, owing to the rivers being unfordable. He stuck to it so firmly that we altered our plans, and decided to find a pass across to the Little Pamir, and come down to Wakhan from the east instead of from the west. While I was shooting on the Great Pamir we sent some horses back for the firewood and barley left on the Pamir river. There was absolutely nothing to shoot, so we did not stay long; we sent back the yourts, and one of the hunters who was no good, and whose horse was lame into the bargain. Some miles to the east of the Victoria Lake we passed another lake, called by the Kirghiz "Aidin Kul," which was almost entirely frozen over on 30th June. Some of the Yarkand Mission in 1874 passed this road in returning from Kala-i-Panj, but being in early spring, and the ground deeply covered with snow; it accounts for their not having noticed it. We re-crossed to the head waters of the Alichur by a pass called the Kojiguit Davan, named, so the Chinese guide said, after a celebrated brigand, who flourished, robbed, and murdered here many years before. On the road we passed a stream, where there were quantities of small trout. After wasting numerous shot cartridges I arrived at the conclusion that if a fish has twelve inches of water over him he is safe. As we marched along we came round a corner right upon some *Ovis Poli* rams; the shikari in front carrying my rifle had not noticed them. I gave a low whistle to attract his attention, but an idiot of a man with us got so excited that he shouted in a loud voice for my rifle, consequently they made off.

Our camp was very exposed and windy, 14,800 feet. We had to drive the pegs in deep and place rocks on the pegs to keep them firm, the storms are so violent. With an improvised needle and mesh and a ball of twine I made a net, so as to be ready for the next lot of trout we might meet. We stayed till 7th July, having had weather all the time, strong gales, and heavy snowstorms. Both the Kirghiz hunters have been ill, doubtless owing to the elevation; but why it should affect them who are so much accustomed to heights, while we escaped quite free from anything worse than an occasional headache, I cannot understand.

We camped at the foot of the Andemin Pass, but there was abso-

lately no fuel, so we had to use our last sticks of firewood to cook our dinner and breakfast. There were five or six inches of snow this morning, and everything was soaked, but as we had no fuel we were compelled to push on, though it was snowing hard when we started. Cold and miserable we crossed the pass, which was only 15,500 feet. We descended to the Ak Su and followed it up to the Little Pamir lake—Chak Mak Kul, according to the Kirghiz—and camped about one mile east of the lake, which was 13,850 feet. We found plenty of grass and root fuel. A Kirghiz we met says the Kunjutis have sent some fighting men on a raid. He had run away from them, and recommends us to be well prepared; but we were becoming very sceptical of all statements. Our caravan people are very much afraid of the Kunjutis, and they asked us if we were going to take them there. We discovered that our Chinese guide had been telling them that we were going to take them to India and leave them there.

The situation of the Little Pamir lake is very similar to that of the Great Pamir—low shelving banks in a flat valley, with high snow peaks around. Soon after leaving the lake we crossed the watershed between the Ak Su and the Wakhan Su. It resembled the Neza Tash pass in this respect, that the ground was so level that it was not easy to say when the ascent finished and the descent commenced. The net came in very useful; we found a stream swarming with trout, which we drove into the net by dozens, and the whole camp had a feast. Nine or ten miles from the lake the valley closed in, losing its Pamir character, and we commenced to descend more rapidly.

At Bozai Gumbaz, where the valley became narrow, another stream joined the Wakhan called Varjer. We saw here the ruins of an old fort or tomb, and as the valley led by a pass into Kunjut, it probably was a place of some importance. As we went forward the track became worse; we arranged to arrive at the Grundi early in the morning, as the guide said it was impossible to ford later in the day. It was only difficult because the bed of the stream was formed of large stones, and the animals stumbled over them a good deal; but the men stripped, and we had ropes ready to prevent any that tumbled being washed away. Only one pony fell, but the men got him on his legs again, and as he was only carrying the tents, which soon dried, no harm was done. As we got lower it was a great pleasure to see bushes, and later on stunted trees; we had not seen such things since we left the Gulcha valley in Turkistan. The track led along steep slopes, very narrow in places, and prudence made us dismount and lead our ponies, and the further we went the worse it got. At one place the track went down by the river edge over large boulders, and no room for the packs between the water and the rocks. The horses had to be unloaded, and the men and I carried the whole baggage on our backs along the river for a long distance, and up a steep slippery slab of rock.

I reproached Ali through our guide for taking us the wrong way; he replied he had not been here for five years, and in such a country an hour was enough to destroy a road. Eris, one of the Kirghiz from Osh, astonished us to-day by asking us to take him to India. I asked him what he would do when he got there; he said there was no opportunity of making money in Turkistan, and that he had an uncle at Peshawur. Knowing he was married I asked what his wife would do, and our Persian interpreter told me that they frequently will leave their wives for five years at a stretch, and that she was living with her people. Eris stuck to it that he really had an uncle at Peshawur; and as he was our best man we agreed to take him, and send him to Peshawur if we did not go there ourselves.

On one occasion we were on ahead of the caravan, and I was spying the ground for ibex when below me I saw with the binocular fifteen horses and a few men. On looking with the telescope I found there were other men lying down, fifteen in all, and every one armed to the teeth. The Chinese guide pronounced them to be Kunjutis on a raid, so things promised to be interesting. We waited till the caravan came up, got an extra supply of ammunition for my pair of double express rifles, gave my gun to one interpreter, revolver to another, and the other men loaded their weapons and we marched to meet the foe. Mrs. Littledale, the Persian interpreter, and two hunters and myself went forward to parley, and four or five of their men came forward to meet us. We salaamed to each other, and then to our great relief they told us that they were Wakkis and were guarding the pass by order of the Afghans at Sarhad. They were civil and told us it would never do for such great people as ourselves to march into Sarhad unattended, but that if we would wait they would send word to the Afghan chief, and he would come and welcome us himself. On my saying it was very kind of them thinking of it, but we preferred to go on, the murder came out that they had had orders to prevent our passing. So I produced our passport, which was only a Persian translation of an ordinary passport, and said here was an important letter which I must deliver to the Afghan myself, and I meant to go on immediately. Then their head man said that we were better armed than they were and they could not stop us, but the Afghans would kill them for letting us pass. I compromised matters by saying I would go on till we found grass for our horses and we could camp, but they must send at once for the Afghan chief and bring us some fuel.

When we had pitched our camp I noticed that the men were drawn up across a narrow ravine we would have to pass had we wished to go on to Sarhad. Soon after the head man arrived accompanied by half-a-dozen soldiers armed with sniders, very picturesque, but very dirty, and with villainous countenances. We received them in our tent, admitting the two who seemed to have most authority. We explained that we wanted to cross the Hindu Kush into Chitral and did not want to stay

in their territory at all. I produced the passport, and pointed to Lord Salisbury's signature, saying he was the greatest friend the Queen had, and the Persian interpreter enlarged on the dreadful things that might happen if we were kept waiting. They said they would send the letter off at once to the general, and he would be certain to let us pass; an answer would be back the next day. I had no opportunity of seeing the head man alone, though I made several attempts. We gave them tea and some small presents. Directly they left I sent the interpreter after him and said I wished to speak to the head man alone, but back they all came, so that was of no use; they wanted us to go down to Sarhad that evening, but we declined; they evidently did not mean to lose sight of us, for they said they would not return to Sarhad, so we invited them to share the tent with the interpreter, and we gave them a good supper. To prevent any tricks we made three of our men sleep under the outer fly of our tent, one on each side and one at the back, and with our dog at the door. I don't suppose there was danger, but it was well to be prepared, and we had our weapons ready. On the morning of Sunday, 13th July, we marched down into Sarhad (11,340 feet by aneroid, 11,234 by boiling-point thermometer), escorted by a number of ragamuffins. Sarhad is quite a small village with a ruined fort; there is some excellent grazing for the horses; both we and they had earned a rest, but the moment the Afghans gave us leave we intended to move out of their clutches. The Wakhan river flows over a broad gravelly bed, and is cut up into six or seven channels. Across the river is a broad barren-looking valley at the top of which is the Baroghil, looking very low; beyond the Baroghil are some snow-capped mountains which look simply impassable, with one big peak soaring up above its neighbours. On the other side of these snows lies Yasin, where we hoped to pass on our road to Gilgit. The general's headquarters are at Faizabad 225 miles off, so we could not possibly get a reply in a day. Knowing how the Afghans feel towards the Russians, I told Yudin, the young Russian, to keep in his tent out of sight whenever any of the Afghans came to see us, for fear any complication might arise. Imagine my dismay when coming out of my tent suddenly I found him ridiculing the soldiers' tattered and dishevelled appearance. I sent him to his tent on the spot, and he looked pretty grave when I explained to him the risk he ran of getting his throat cut, and told him that they had declined to drink their tea when they found he had made it. In time he might make a good traveller, but he was too young and thoughtless for a trip of this kind.

The following day, instead of an answer from the general, the captain in command at Kala-i-Panj arrived with six more men. They were perfect caricatures of soldiers, and would have made the fortune of any pantomime, dressed in all sorts of old uniforms, some with shoes with very pointed toes curled up in front over the instep. The captain and his retinue paid us two visits to-day; during one of the visits we

discovered that the captain had intercepted the first letter that was sent, and destroyed it; he said the head man at Sarbad had no right to write to the general. Next morning we concocted fresh letters, one in Persian, another in English, and the captain promised that they should be sent full speed. There are stations about ten or twelve miles apart, and one man with fresh horses takes it right through. There was nothing for it but patience; but it was rather annoying to think that we only wanted to pass through about twenty miles more of Afghan territory and then we should have been out of it in Chitral, which is an independent State. They placed sentries round the camp, and if I went out for a walk my doings were watched.

The captain came to see us twice a day, and used to stay two or three hours at a time. It was difficult to find topics of conversation which interested him. He told us that three men had been sent to Cabul to be executed. They told the Amir if he would let them off they would tell him where he could find silver. They were sent under a guard to Iskasham, where they commenced to dig; a door was put to the mouth of the mine. They worked for twenty days and only found earth. They were only to be allowed a few days more, when if they found nothing they were to be executed. The next day they came to silver, very rich, and now more men are being employed every day.

On the fourth day we heard shouting, and a number of men arrived; it was the Governor of Wakhan, Gholam Hussul Khan, a good-looking young man; he stated that he had nearly reached Faizabad when he heard we were here, and he had come to see that we were comfortable. He said "Our Queen was their Queen, their country our country." I had to reply, "Yes indeed, we were brothers," but I could not help wishing all the same that our new relatives would cut their hair, and be generally a little cleaner. He wore a smart turban, with the name "I. Greaves and Co., Manchester," stamped conspicuously upon it.

I asked about crossing the Mastuj river. The captain said, "When the order came he would make such a road that we should not know whether we were on land or water."

Outwardly the men were civil, but we know we cannot believe a word they say; they tell one story in the morning, and deny it at night. The Governor let out that he had intercepted the second letter we wrote, and had destroyed it, saying the captain ought not to have written to the general. So we wrote a third epistle to the general, which the Governor said should be sent off. In the night the captain quietly came to the camp and said, "The governor was a bad man, and had not sent our letter, but if we would write another, he would send one of his own soldiers with it." So a fourth letter in English and Persian was written, and we took the opportunity, the first we had, of saying we should feel generously disposed towards any one that helped us to reach Chitral.

The days passed very slowly, and we quite despaired of being allowed to pass. We determined, in the event of being turned back, to try and find a pass into Kunjut, and come down through Hunza into Gilgit. It would have been a forlorn hope, as I don't think we could have got a guide, and I question if any of our men would have dared to come; failing that we should have gone east to Yarkund, and if it were not too late in the year have crossed the Kara Korum to Ladak.

The governor told us that last year a Russian party arrived at Kala-i-Panj, and wished to pass through to Kafiristan. They also, like us, were told that they must send and ask the general, who sent word to say that they were not to be allowed to pass. Then they said that they were Russians, and they never turned back; the general was consulted again, and he sent word that if the Russians refused to go, they were to take stones, break their teeth and send them back. That was the Afghan version of the affair. On our previous expedition we had made the acquaintance of Grombehevsky, the ruling spirit of the Kafiristan expedition, and very pleasant he was. I should like to meet him again, to hear what really passed on this occasion. Since the governor's arrival, they bring us every day presents of chickens, butter, sheep, &c., far more than we could possibly eat, and as it is the poor Wakhis who have to supply them, we take as little as possible, and then endeavour to find out the owners, and pay them.

A courier arrived to-day, full gallop. When questioned, the governor appeared ill at ease, and then said the man was bringing food—a palpable falsehood. We do not know how we stand with these people, and their excessive politeness made me very uneasy. Yesterday they showed a portion of a letter purporting to come from the general, asking for more information about us, and why friends of the Amir should be travelling in company with a Russian. We had to be diplomatic, and explained that he was only a boy who came as interpreter, and he was going back with the caravan to Turkistan. We found it was madness to think of taking him with us.

In this atmosphere of deceit and lies we did not know what the day might bring forth. I tried another tack to-day; we would not receive the Afghans in our tent, but I met them in the servant's tent, and did not ask them to sit down. I reminded them that they had frequently said that we were brothers, but when I asked so simple a thing as to be allowed to make a day's journey across their country, they had kept us waiting ten days, surrounded our tents with soldiers, so that if we had been enemies they could not have treated us worse. I got them to promise that if no answer came on the following day we might start without. The promise was not worth sixpence. The following day, the 21st July, I had a long talk with the captain and governor, and told them that we intended to start the next day but one, and that if they attempted to stop us, they must not talk any more about the Afghans being friends

of the English, and I did not know what the Queen's Prime-minister would say when he heard that his letter had been torn up. They told us we could ford the Wakhan river to-morrow and camp, and the following day cross the Baroghil. We pointed out to them that if we sent our caravan back to Turkistan, and they afterwards stopped our crossing the Hindu Kush, it would be absolutely impossible for us, with only two men and the few horses, to recross the Pamir. They then said we had better take the whole caravan across. We refused point blank, as we did not understand the motive for the move. If it was that we were eating up their winter supply of grass, so much the better, for we should have a decided answer all the sooner.

That evening a messenger arrived with a letter purporting to come from the general saying we could go. Directly we were told we set to work and separated our clothes that we wanted, and food supplies; had all the horses' feet looked to, and picked out shoes to fit each horse, and nails, and by the time I had paid off the men and written some letters it was two a.m. We were called at four. The Afghans, when I asked them to supply me with fifteen men to help us over the Hindu Kush, said I could have 1500 if I liked. I also asked for six yaks to help to carry our baggage over the ice. We left behind us everything we could possibly spare to lighten our baggage as much as possible. We offered very high wages and three ponies to the caravan bashi's brother if he would come with us to Srinagar. I told him I would send a man with him to Leh to see that he joined a caravan returning to Yarkund, to which place he had often been before; but in the morning he said no; he was frightened to go so far away from home. The Chinese guide told some man, who repeated it to us, that he intended to get some Kirghiz together and rob the caravan, as they returned. I called him up, and explained to him that I had photographed him, and if our caravan was robbed I should write to the Governor of Kashgar, send his photograph, and say that he was the man who did it, and ask to have him crucified and disembowelled. He seemed impressed with the reasonableness of my remarks, and simply said, "Then it was not worth the risk."

Next morning we made a present of money to every Afghan soldier, and we gave field-glasses, watches, clothes, &c., to the chief officers before we finally got out of their clutches. We started our old caravan off, feeling rather uneasy about their getting back safe, but they did so eventually. Our party now consisted of Mrs. Littledale and myself, the Persian interpreter Joseph, and Iris the Kirghiz, and twelve horses.

We had not the faintest notion what kind of a reception we should meet in Chitral and Yasin, so we took with us enough flour, &c., so as to be, if it came to a pinch, independent of the country for supplies. The governor escorted us to the edge of the river, and said good-bye, and the captain and some soldiers came with us. The Wakhan river was divided into

many channels; the water, fortunately, was a good bit lower than it had been, and the horses all got over just without swimming. We had packed their loads very high, but some of them got wet. On the other side, where they suggested our camping, the midges were simply unbearable. After we had gone some distance a friend of the governor came galloping after us, and we feared fresh complication, and a great row took place between the Afghans. The captain's version was that the friend wanted him to leave us to find our own way.

We crossed the Baroghil, which is an extraordinary depression in the Hindu Kush, two or three miles in width. On either hand the mountains rise to a great height. We forded the Mastuj river, which was much the same depth as the Wakhan, and camped on the further bank. We held a kind of durbar, and I wished to present the captain, who had been the best of a very bad lot to us, with a watch, so I took my gold one off the chain, put it in my knickerbocker pocket, and replaced it with the silver one. At a suitable moment I took it out and off the chain, and presented him with my own watch, which he received with protestations of gratitude. We gave our final presents, and got rid of the last of them. When I put my hand into my pocket to replace the chain on my watch, I found, "Heigh presto," it had vanished, and the humiliating truth dawned upon me that the Afghan had got, not only the silver watch, but my gold one as well. The Governor's friend to whom we had given a pair of fur gloves sent them back, and said he did not want them. If we could have spared anything better to give him we should have done so as a matter of policy, for he was a demon; but we had to keep some presents for the Chitrali and Yasin people.

Our fifteen men were reduced to seven. Three of them and a yak started ostensibly to get food and never returned, the others were going off and I forcibly stopped them, and at last made them confess that they had all been told to desert us. I talked to them and promised them high pay; they wanted an advance. One of them, by good luck, happened to have owned a sheep, which the Afghan Governor had presented to us, and which when we had afterwards discovered its owner, we had paid well for, and he said that people who would do that could not be thieves, and they would stay. We took however the precaution of putting them to sleep in the tent and watching them all night.

In the morning a small Tajik official appeared on the scene. We were afraid of fresh trouble, so we crossed his palm with silver, and he frankly admitted that he had been sent by the governor's friend to get these men to desert, and to tell us to wait till to-morrow, by which time he would probably have concocted fresh devilries. So we packed up and started forthwith, and went on till we were right at the foot of the ice. There was no grass for the horses, but we had enough barley for to-night and to-morrow. There was also no place to pitch a tent, so we

slept out among the rocks. The men wanted us to stop before, but we were so uncertain of the intentions of the Afghans, that we placed as much distance between them and us as possible. After arranging our bivouac we set to work with axes to cut steps for the horses up the ice on the glacier in readiness for the morning.

Our Tajiks seem a happy, good-natured people. We take care to give them plenty to eat—a full stomach works wonders. Our interpreter has just discovered that the Yasins are Shias, and told us that to make things comfortable, when he gets there he will be a Shia Persian. In Badakshan he passed as an Arab, ridiculing to the Afghan the idea that he was a Persian.

We were up at three next morning, and as soon as there was a glimmer of light we started and got on to the glacier by the road we had engineered up a steep ice slope. Once up the travelling was easy, and we made good progress till the sun got up and softened the snow; then our troubles began, and the horses were continually breaking through the crust and tumbling, and their loads had to be rearranged. I began to think that we should not reach the top that day, but soon after we left the soft snow behind. There were a few crevasses near the summit (15,950 feet), which had to be avoided. There were glorious views all the way up the glacier of icy peaks on either hand. When we arrived at the top and looked down the other side it was hard to believe that it could be possible for horses to descend, and I questioned the guide to make sure we had not come up the wrong glacier. The slope of the ice, as far as we could see, was not great, though very much crevassed, but, beyond, the sides of the valley were so extremely steep that it certainly would be no child's play going after ibex on that ground.

We could not see the actual place we had to descend, but I never saw a more unpromising look-out. One of the Tajiks and I went in front sounding with our alpenstocks through the snow for crevasses, which were very numerous. At last we came to a place where we were compelled to leave the ice, and crossed over a small moraine on to another small glacier. It was easy enough getting on, but when at length this piece of ice also became impassable, we had great difficulty in getting off it; the ice had melted away from the rocks. There was a gap of several feet, and worse than that the ice was in most places undermined, and was only a thin slab. We had to find a place where there was only a few feet of space between the ice and the bottom, and fill it up with rocks.

There was a second small moraine now between us and the main glacier, and our horses got on a steep piece of ice covered with snow, down which we were compelled to go. One of the horses behind fell and, in rolling down the slope, knocked the horses below him off their legs, like a row of nine pins, and down four or five of them went rolling head over heels. The first one lodged in a crevasse, filling it up, and the

others went over him, down on to a snow-bank. The yak was the only animal that came well out of the business; he declined either to fall or be knocked over, but slowly and surely descended with his load intact. For this kind of work they beat ponies altogether. All the other animals had to be unloaded, and we packed on our backs their loads. Then we got all hands to work to get the pony out of his dangerous situation. We first cut foot-holes in the ice for those who had to stand on the upper side of the cleft, for a slip would have been serious. We nearly gave it up once as hopeless, but with the aid of tent poles as levers we at last got him out, and collecting all the odds and ends that had been scattered about on the snow, we made a fresh start.

The crevasses were mostly covered with a thin coating of icy snow, which made slow progress imperative. One horse broke loose and trotted away, till it found itself on a tongue of ice between two enormous crevasses. There was only just room for it to turn, and, as it carried our bedding, we watched the movements of the beast with considerable interest, but a man cleverly piloted it out of danger. When we got off the ice we had a long and extremely steep descent down the moraine, and by the time we reached the bottom of the valley, 11,050 feet, it was getting late, and both man and beast were glad of a rest. Next day, on arriving at the village, the head man presented us with the most attenuated little lamb we had ever seen. The houses were wretched, and the whole population seemed most miserably poor. They have all jet black hair, with rather an effeminate expression, but very wild-looking eyes. They wear their hair very long; it is often dressed in two plaits and fastened to the back of the hat, which is like a pork-pie with a thick roll round the bottom.

The news of our arrival had spread far and wide, and we received a letter from the governor welcoming us, and sending a basket of apricots and grapes. Our horses' feet were getting in a bad state after crossing the Darkot. I don't think there were six shoes left on the forty-eight feet of our twelve horses, and we found that our caravan bashi had substituted a bag of worn-out nails which he had for the new ones, and we could only shoe very few of our horses, and those only in front, consequently the poor beasts, as time went on, got very foot-sore as the roads were always stony. Every village here has its stone fort, inside which are generally a number of houses, and room for their flocks, showing the insecurity of the country in the past.

At one village the head man insisted on putting a watch round our camp, saying there were some bad characters about. Probably he knew there were rufes about, and he wanted to earn some. We paid a visit to the Governor of Yasin. He came out to meet us, and led me by the hand into his tower. We gave him some presents and a sheepskin coat. The old reprobate said he was obliged for the presents, but he would like some money too. I told Joseph to talk civilly to him, but we paid

a hurried adieu; for we felt if we stayed longer we did not know what fresh demand might be sprung upon us, so we fled. The apricot trees are the feature in Yasin; it was just the season for the fruit, and they were lying rotting upon the ground by the thousand, the little irrigation streams were choked with them, so that we had a grand feast. The weather was getting very warm, and we felt the change from the Pamir. We tried very hard to induce the Tajiks from Wakhan to come with us to Gilgit. They were such handy men at packing the horses, but they were afraid, and we were reduced to having Yasins, and a more lazy, worthless set I have never had the luck to come across. We had two men for each horse, but only two or three out of the whole lot were of any use whatever.

One of the horses as nearly as possible came to an untimely end; his pack caught against a projecting rock, he was sent on to his knees, his life hung in the balance, but he just, and only just, managed to recover himself. One night we camped by a river across which there was a *Jula* or rope bridge, over which we had to go in the morning. These bridges are formed by three ropes made of willow twigs; you walk on one, and the other two you hold on by your hands; it starts high above the water from the rocks, and sags down in the middle. Mrs. Littledale had always announced that she was ready to go anywhere or do anything except cross a rope bridge, and how I was to get her over in the morning I did not know. We selected a strong man, and she got on his back, and they started off across the bridge. I had previously arranged my camera to photograph her in the act of crossing. She had got one-third of the way across and I climbed down to pull the shutter thinking all was right, but she had opened her eyes, and the height, the rushing water underneath, and the swaying of the bridge had frightened her, and she was telling them to take her back. The interpreter unfortunately was not there, but I shouted to them in Hindustani, in Russian, and in Kirghiz, to go on quickly and take no notice, but they did not understand me, and thought I was telling them to return, and back they came. Mrs. Littledale said she was ready to try again if we would tie her on, so that if she fainted she would not fall, but it could not be arranged.

We had to think what was to be done. The men said if I would go away out of hearing they would carry her across whether she liked it or not. Women are little thought of in those parts. I suggested a raft; they said at first it was too dangerous, but, since there was no other course, we tied inflated sheep-skins to a camp bed, and sent it on a trial trip with five men swimming alongside, each man having his own skin. It was so buoyant that Mrs. Littledale said she was willing to cross in it. They made her lie down, tied her fast and started. The river flowed over great boulders, and though the raft was often lost sight of in the spray, it got across safely, having been taken by the current a quarter of a mile down stream. We took some dry things over the bridge for

Mrs. Littledale, who had been lying half under water when the raft was stationary, and when she arrived on the other side a more dragged specimen of humanity was never seen. Our horses had to swim across and three or four of them were nearly drowned.

We received a letter from Ali Merdan Shah, a Wakhan refugee, welcoming us to the country, and offering to be of service. Our poor horses' feet were getting in a dreadful state, the roads were so stony, and their shoes were almost entirely gone. We kept Mrs. Littledale's pony shod, but all the rest had to limp along as best they could. At one village a man said he could make shoes if we would give the iron. We had two iron bars on which they rested the pots over the fire, and I also gave some tent pins, and the man made a few shoes and nails, which we put on the lamest of the horses. The men are very poor specimens, and we made very little progress, the road being so bad that we had to unpack the horses and carry the luggage over difficult places twenty times a day. The heat in the middle of the day was very trying, and our Kirghiz dog felt it very much. He used to lie down full length in every stream.

The head man of Gakuch came to meet us. He said there was a short way by the river if we chose to walk, but the ponies must go over the mountain. It was a rough scramble over rocks and round corners on logs jambed into crevasses of the rocks, and then down a perpendicular crack in the rock by ladders formed of single poles with notches cut for steps. One man went in front to hold Mrs. Littledale's feet in the notches, while another held on to her dress above. The dog was held by his tail, and passed down from one man to another, and he evinced great joy when he found himself safe at the bottom. It was bad travelling, but we saved a long round, as the horses did not come for several hours afterwards.

I addressed a letter asking for horse-shoes to "the Englishman in Gilgit" on the chance of there being one there, and on the following day got a letter from Mr. Manners Smith, acting in the absence of Col. Durand as political agent, asking us to stay with him on our arrival at Gilgit. Our letters had crossed on the road. At Gakuch we camped under apricot trees, which were a perfect marvel; nobody seemed to pay the least attention to the thousands upon thousands of the fruit that lay rotting upon the ground. The apricots were only equalled in number by the flies; the roof of our tent inside was covered with them as thick as they could find room, and the noise was like a distant waterfall. We kept under our mosquito curtains, otherwise it would have been impossible to remain in the tent. We passed at a place called Cher, a very long and high rope bridge, which 12 years ago broke, and 15 men who were on it were all drowned. We saw the natives come down the river on skins, in which they put their clothes and then inflated them with air; they said you could go down to Gilgit that way,

but you had to leave the river several times, as the rocks were dangerous. I should liked to have gone down that way, and have avoided these tiresome hills.

Mr. Manners Smith kindly sent his own syco with a supply of shoes, and he met us and shod our horses all round; poor beasts! they had got very footsore. While the horses were being shod, I watched the natives play a game; they stood on one leg and held the other up with one hand, and with the other hand they wrestled and tried to throw their adversary. They might catch hold apparently anyhow or anywhere; one little imp watched his opportunity, and while two men were struggling hard sent them both sprawling on their backs into an irrigation channel. We had not been able to get any grass for our ponies, and could only give them chopped straw and a little grain. To give our horses a rest we got coolies to carry our baggage, they went a shorter way; the bearer told us that one package had fallen into the river, and was swept away in a moment. It was an anxious time till we knew which, but by the greatest good fortune it contained nothing of any importance.

On the 7th August we came round a corner and saw the town of Gilgit ahead of us; a green patch among the brown-looking mountain. We went through narrow lanes, the trees loaded with peaches not quite ripe, and the branches festooned with vines, the grapes of which "had not arrived," according to Joseph the interpreter. We were most hospitably entertained at the Agency by Mr. Manners Smith. We disposed of our baggage ponies in Gilgit, and also left our dog, who would never have stood the heat of the plains in India. Ali Murdan Shah sent us a present of two hunting dogs, and some young snow leopards to Mr. Manners Smith. It would have been a great triumph if we could have brought the leopards to England alive. After spending a few days shooting, we went down to the Indus to cross by the ferry to Boonji, which took us all day as the raft had to be towed up stream again after every crossing. In crossing this ferry three days before they had overloaded the boat and seventeen men were drowned, and Dr. Robertson, who was going on a medical mission, lost all his baggage. The Shikari who told us about it looked astonished when I said "seventeen poor men," and remarked "there are lots more coolies, but the Sahib's baggage has gone."

A white face was supposed to be all powerful, but at Damot and Boonji Mrs. Littledale established a great reputation of another kind; a sick man had come to her to be healed, and she thinking that certain widely advertised pills would please the man, and at the same time could do him no possible harm, gave him a couple; the effect was marvellous, and the fame of the cure spread through the country; our tent was besieged by poor creatures for whom of course we could do nothing.

On leaving the Indus the track leads straight up the side of a mountain 6000 feet without a drop of water to be had. We saw the

bodies of eight dead ponies, and smelt several more, killed by the very severe pull up the hill. At Astor we met several old acquaintances among the natives who remembered us 12 years before. Our old Shikari met us here, and it was quite like old times seeing him again. He made all the arrangement for coolies, &c. We had a visit from a Kashmir official who had been with Colonel Lockhart in Badakshan; he appeared very surprised when we said we had passed through undisguised, for he said there were (as Joseph expressed it) "plenty of wrong people and thief man there."

We reached Srinagur on the 4th September. We sent Iris, our Kirghiz, to Peshawur with letters to some traders in case he wished to return home through Afghanistan. He had done so well that we paid him handsomely and were sorry to part with him. We were much amused at hearing that one man had stated that he did not leave Kashmir until he had seen the lady who walked from Europe. We sold our remaining ponies, and after ten days' stay, left Srinagur for Simla, where Mrs. Littledale and I were most hospitably welcomed. We felt in capital spirits at having successfully accomplished what we had attempted. Our clothes were in a very dilapidated condition, but we had neither of us had a day's illness since we left home.

The foregoing paper, was read to the meeting by Mr. Douglas Freshfield, Secretary, who prefaced it with the following introductory remarks:—

Time will compel me to abbreviate the paper it is my duty to lay before you to-night. It will be printed in full in the 'Proceedings,' and there you will be able to read Mr. Littledale's complete narrative, showing not only how he crossed, but how he reached the Pamir.

To-night he and you must excuse me if I substitute for several pages of very interesting detail a brief introductory statement such as the occasion seems to call for. I propose as shortly as possible to answer these three questions:—What is the Pamir? Why did Mr. and Mrs. Littledale cross it? How came it that they crossed it from north to south?

On the large map of Asia we note the spot, where the three great empires that divide Further Asia meet. There is the Pamir, a name introduced, perhaps, into English poetry in the noble description in which Matthew Arnold, at the end of his 'Sohrab and Rustum,' showed how the imaginative faculty might be linked with physical geography—

"Oxus forgetting the bright strength he had
In his high mountain cradle in Pamere"—

a name made more familiar lately by the special correspondents who emulate and even excel the poets in their application of that faculty!

This Pamir or Pamirs—for Pamir is a generic term; the different

strips of tableland are distinguished by separate names—is a vast table land averaging 12,000 feet in height and 280 miles in length by 120 to 150 miles in breadth, ringed by a rough horseshoe of mountain ranges, and intersected by snowy ridges and shallow trenches that deepen westwards, where the streams of the Oxus descend towards Bokhara. The numerous photographs taken by Mr. Littledale exhibit a characteristic type of landscape:—tent-shaped, glacier-coated mountains divided by broad easy gaps; bare heights naked of verdure and shorn of forests by the bitter winds and frosts; desolate lakes; a region where for the most part there is neither fuel nor fodder; an Engadine of Asia, with nine months winter and three months cold weather; the home of the wild sheep, the summer haunt of a few wandering shepherds; nomads' land if not no man's land. Long ago Marco Polo described it well. That is the scene of Mr. and Mrs. Littledale's adventures; that is the region where the emissaries of three nations are now setting up rival claims.

"The half-way house to heaven" is a Chinese appellation for the Pamirs. "*Colum ipsum petimus stultitia*" our and the Russian soldiers and diplomats may now almost say of one another; for the tales of summer pastures of extraordinary richness told to Marco Polo and repeated to Mr. Littledale refer, so far as they are true at all, only to isolated oases, and the fertile tracts described at the end of Mr. Littledale's paper lie in valleys outside the Pamir region. The country in question cannot feed the caravans that cross it; far less could it sustain the baggage animals of an army on the march.

No one in his senses could consider that in itself the Pamir is a desirable acquisition. Any value it may have is in relation to adjoining lands. From the north there is comparatively easy access to it from Russian Turkistan. From the east the Chinese and their subjects climb up the long ascent from the Khanates, and pass through gaps in the encircling horseshoe of mountains on to the portions of the tableland they claim. From the south-east M. Grombchevsky found a pass a waggon might cross into Hunza. From the south a route, which seems from Mr. Littledale's experience to be anything but a military route, leads over glacier passes, and through well-nigh impassable gorges into Yasin and Gilgit, and so to Kashmir. To the south-west easier routes, little known or little described as yet, lead into the wild regions of Kafiristan and Afghanistan.

We do not here deal with politics, but we do deal with the geographical and cartographical facts on a knowledge of which politics and policy ought to be—but unfortunately for our country have not always been—based. Certain portions of the Pamir have been more or less closely attached to Afghanistan. The Amir now lays claim to Wakhan, Shiguan, and Roshan, tracts stretching along the sources of the Oxus. It is obvious that England may claim an interest in these, but probably,

owing to the deficiencies in exact knowledge of the geographers of Cabul, we have not as yet publicly defined our claims.

Russian maps show Bokhara as extending to the great snowy range that descends at Tash-Kurgan, on the Lower Murghab, to the Oxus, but no further; and it is in respect of Bokhara alone that Russia seems to have any plausible title in these regions. For the assumption, that whatever is nobody else's is hers, that she is the presumptive owner of all unannexed districts, the "picker-up" of all "unconsidered trifles" in Asia, can hardly be put forward as a serious argument by statesmen in the study, although it may be acted on occasionally by energetic officers in the field.

The Chinese Government, through its officers at Yarkand, raised its flag in 1883 in the district of Sarikol. At many places on the Pamirs Mr. Littledale met with Chinese subjects. The Chino-Afghan frontier was, he found, at Burzula Jai. His paper was in print before the events of last summer, and his observations were made, therefore, without any eye to subsequent events. It would appear to the impartial observer that whatever part of the Pamirs south of the Murghab is not Afghan has been *de facto* for some time Chinese.

The accidental presence of Russian official travellers, of course, is no evidence of title, the extent of M. Grombchevsky's travels, indicated on the map by a black line, reduces such an argument *ad absurdum*.

With this preliminary remark, I may point out the spots, the Alichur Pamir and Bozai Gumbaz, where Captain Younghusband encountered Russian officers last summer.

These are some of the facts as to the present condition of the Pamir. We may confidently trust that the courtesy hitherto shown on both sides will be continued, and that the wisdom of well-informed diplomatists may settle a matter, the importance of which may easily be exaggerated, so as to satisfy the claims of our ally the Amir without involving England in a dangerous extension of valueless territory.

I proceed to answer my further questions. Why, undeterred by the experiences of which that entertaining traveller and Anglophobe, M. Bonvalot, had lately given so alarming a picture, should an Englishman and his wife cross this desert? Mr. and Mrs. Littledale are eager in the pursuit of rare game. They were old travellers; they had sojourned in the forest wildernesses of the Western Caucasus; they had on a previous occasion penetrated Central Asia. A pair of horns were to them what a bit of rock from a maiden peak is to others.

And lastly, why did Mr. and Mrs. Littledale go from north to south? Why did they, being English, make Russian territory their starting point? Thereby hangs a tale.—Because our Anglo-Indian Government prohibits all independent travel in its trans-frontier lands. Something may be said for this course, but it does not stop there. It also gags its own official explorers. It carries yearly farther and farther the policy

depreciated by Sir H. Rawlinson in this Hall, when he said, "Russia deserves all honour for her services to geographical science in Asia. I only wish I could say as much for ourselves as regards our own frontiers."

No one, least of all the Council of this Society, would ask for the publication of any tactical information our military authorities desired to withhold. But the military authorities go along with us in asking for an intelligent censorship in place of a wholesale system of suppression of the mass of knowledge, general and scientific, acquired by the servants of the State in our frontier and trans-frontier lands. We believe, and the Council have represented to H.M. Government, that the present practice is not in accordance with the existing official rules, that it was intended and has been ordered that expurgated copies of all official reports of public interest should be given to the public. They hope that the departments concerned will before long be instructed to give practical effect henceforth to any such instructions that may exist, and thus that the forward march of English power may once more, in Asia as elsewhere, be accompanied by a general advance of scientific knowledge.

Meantime we have to-night to be glad that the Pamir has several sides, and to acknowledge our debt for the kindness and courtesy shown by the Russian Government and its officers, and more particularly by Colonel Doubner, the Commandant at Osh, without whose aid Mr. and Mrs. Littledale could hardly have effected the journey the story of which I shall proceed to read.

The following discussion ensued :—

Mr. H. SEESOM (Hon. Secretary R.G.S.): It may interest the meeting to know that the birds of the Pamir district have been collected and studied by the celebrated Russian traveller Severtsof. The last time I was in St. Petersburg, when I had to leave it rather hurriedly in consequence of the assassination of the Czar, and went on to Moscow, I spent a week with this savant, turning over the magnificent collections he had brought from Turkistan and from the Pamir. He afterwards wrote a paper upon "The Birds of the Pamir," which was published, with a considerable amount of interesting geographical information, in the ornithological publication known to many of you here as 'The Ibis,' published in London. Among his remarks about this country, the Pamir, he describes it as being four-fifths composed of huge mountain ranges, with comparatively no valleys between, the lowest valley being twice the height of the Engadine, or 6000 feet above the sea, and the ridges many of them rising 1000 feet higher than Mount Blanc. On the northern slopes, he says, the perpetual snow begins at 15,000 feet, and on the southern slope at 18,500. The climate, as you have heard described in Mr. Littledale's excellent paper, he mentions as being ultra-arctic, the last half of July is the only time of the year in which the thermometer does not go down to freezing-point. He says that the waters freeze in October, and the rivers do not thaw until the end of April, nor the lakes until the end of May; and he also describes the climate as being very windy. Nevertheless he was successful in obtaining 120 different species of birds. About half

these species are those common to the Palearctic region, and whose range extends, either in summer or in winter, from the British Islands as far as Japan. Of these some breed on the Pamir, but a considerable number of them only pass through, on migration. There are scarcely any birds peculiar to the Pamir, because, of course, a great many of them cannot live there in the winter; but there were two very interesting birds which he obtained—the sand partridge, a large partridge as big as a small turkey, and the sand grouse, not the one which has visited us here during the last half century in considerable numbers, but a very nearly allied species, the Tibetan. He gives in his paper a number of interesting particulars which it may interest you to read, but which I will not detain you any longer by mentioning this evening.

SIR PETER LUMDEN: I do not know, Sir, that I can add anything to what has been already so carefully described by Mr. Littledale, or to the paper that has been referred to by Mr. Seebohm. It is a great satisfaction to me to see a map of the Pamir, such as the one hanging on the wall. More than thirty years ago I had to draw up a plan of the Pamir from information derived from a guide that went with Sir Douglas Forsyth to Yarkand. Of course that map was a very different thing from the map now before us. I think the Geographical Society extremely fortunate this evening in having had a paper from such a high authority as the author, and every bit of information we can get on this country adds a great deal to our knowledge of what is at present one of the most interesting parts of Asia.

General R. STRECHER: The description given by Mr. Littledale of his journey across this great mountain region, shows, what really we have known for some considerable time past, that this Pamir region is nothing more than the extension of the Highlands which form one of the peculiarities of the great region of Tibet. The Pamir, in fact, is the extreme west end of the Tibetan tableland, as we call it, in reality it is as rugged a mass of mountains as well could be conceived. The description Mr. Seebohm has given from the Russian naturalist who visited the Pamir applies in reality to the whole region from the westward boundary of the map before you, eastward to the boundary of China. Tibet is characterised by its huge mountain ranges with narrow valleys, having comparatively flat bottoms with small streams in them and lakes, such as are described by Mr. Littledale, impregnated with what he describes as alkali, but which is in reality closely allied to Epsom salts, and a great many of these large lakes are in reality huge reservoirs of Epsom salts or glauber salts. The whole characteristics, both of the vegetable and animal life on the Pamir, are quite similar to those of the parts of Tibet that I myself have seen, and the regions of Tibet farther eastward which other travellers have gone through.

It is a wonderful thing that rational people should talk about a region of this sort as something to be coveted and something even possibly to be fought over, and one might really almost as rationally talk of fighting for the possession of, shall I say, a square mile of the Moon, or of Sirius. This would be just as wise, really just as rational, as possibly you will be able to judge for yourselves from Mr. Littledale's account of his journey. With a very small number of horses—ten, twelve, or fourteen—gradually dwindling away as they perished, obliged to carry his food with him, nothing in the shape of fodder available, having to carry fuel to cook their dinners. The possibility, of anything like military operations being carried on over a country of that sort is so perfectly ridiculous, that to my mind it is astounding that it should appear to be seriously discussed. The way in which the question of the occupation of this region, either by Russia, Afghanistan, China, or Britain, occupies some people's minds, I can only regard as an illustration of the folly of humanity.

Dr. LEITNER:—I wish to state that Col. Grombehevsky's account would answer a question put by Mr. Littledale, an account which will shortly be published in the 'Asiatic Quarterly Review,' describing his visit to the Pamir late in July and at the beginning of August, and which gave him a somewhat more favourable picture of the Pamir or Pamir than that represented by the gentlemen who have spoken to-night. What he says in his account is this:—"The Pamir is far from being a wilderness. It contains a permanent population, residing in it both summer and winter. . . . The population is increasing to a marked extent. . . . Slavery in the Pamir is flourishing; moreover, the principal contingents of slaves are obtained from Chatrar, Yasin, and Kanjut, Khanates under the protectorate of England. . . . On descending into Pamir we found ourselves between the cordons of the Chinese and Afghan armies. . . . The population of Shiguan, numbering 2000 families, had fled to Pamir hoping to find a refuge in the Russian provinces from 'the untold atrocities which the Afghans were committing in the conquered provinces of Shiguan, &c.' . . . I term the whole of the table-land 'Pamir,' in view of the resemblance of the valleys to each other."

It is just as correct to talk of Pamir in the singular as it is of Tibet in a general sort of way. We certainly have Little Tibet, Great Tibet, South Tibet, but do not say Tibets, as we might; and geographically speaking I dare say the Pamir represents a fact in the construction of this earth. It would be well to know what Pamir means. In the expedition led by Sir D. Forsyth, in which he was seconded by Col. Trotter and others, they agreed that Pamir meant "desert"; in other words, if you come from the Khokand side, it is "the desert" that way; if from the Afghan side, if indeed there is an Afghan side, there is a desert that way. Each side is approached through a particular desert, and would get the name "Pamir." But in reality it does not mean desert at all; it means "plateau." It is a Turki (Yarkandi) word, and the Kirghis also call it Pamir. If you find a name predominant all over a certain region, it points to its occupation by a certain tribe; thus, if you see on the one hand words like Sarhad, Murghab, you think of a Persian population; when you find words, on the other, like Yashul Kul, "green lake," Sari Kul, "yellow lake," you know the Kirghis have used it either temporarily or permanently for pasturage. Now Mr. Littledale's paper is most interesting, but if he had gone a month or so later he would have had more success as a sportsman, because nothing can exceed the abundance of game to be found in the direction, say, of the Taghdumbash Pamir; and the existence of the horns of dead *Ovis poli*, overtaken by the severity of the climate, shows at any rate that there were living ones. In the Arctic regions you have abundance of life, both fish and animal, and this to a certain degree is repeated on the Pamir, where there is an abundance of animal life to attract a sportsman and ornithologist. Now I have with me the map of Col. Grombehevsky, which is in one important respect not so correct as that of Mr. Littledale, because on his map, which is in its way invaluable, we find Hunza on the wrong side of the river, where Nagar ought to be, and the rest of the country is called Kanjut, of whose people Mr. Littledale professed to have had some little dread; certainly, if he had gone into the country he would have found a most remarkable and interesting race, and felt, if he is a linguist, that there indeed was, if not the cradle of the human race, at any rate, the cradle of human thought expressed in language; however ferocious the Hunzas may be, they are, like other people, amenable to reason, and I have not the least doubt that Mr. Littledale's prudence, which he so well showed, would have enabled him to overcome any difficulties with them.

I was sorry to find from Mr. Littledale's account that the Waklis and Yasinis have so fallen off in physique, as they are a splendid race, and I will read to you what Col. Grombehevsky says about the Darwáz Táyiks, who resemble them. "They

are pure Aryans, and of exceptional beauty. The women are especially lovely, with their pale delicate faces, remarkably regular features, and wonderful eyes."

To show that the people are not such very great barbarians, I have some articles of their own manufacture to show you (textiles, horn-carving, &c.). As a result of all this we can see that, just as it is precipitate to allege that the Pamirs are always uninhabited or uninhabitable, so it is equally precipitate, as General Strachey says, to say this is the road to India. Above all would it be a mistake to take away the natural boundaries which the situation of the Pamirs has given, by interference with the autonomy of the native rulers around them, both our peace and that of Russia being dependent on the strengthening of that autonomy. The letters I have received, and which I have with me, from Nagyr and Yasin, point out that for the maintenance of pleasant relations between Russian and our sportsmen on the Pamirs, nothing is needed for the preservation of peace—no demarcation commission, no diplomacy, and certainly no army.

The climate of the Pamirs is variable, from more than tropical heat in the sun to arctic cold in the shade, and, in consequence, is a like provocative and destructive of life. Dr. G. Capus, who crossed them from north to south, exactly as Mr. Littledale has done, but several months in the year before him, says, in his '*Observations Météorologiques sur le Pamir*,' which he sent to the last Oriental Congress, "The first general fact is the inconstancy of severe cold. The nights are generally coldest just before sunrise. . . . We found an extreme amplitude of 61° between the absolute minimum and maximum, and of 41° between the minimum and the maximum in the shade during the same day. . . . The thermometer rises and falls rapidly with the height of the sun. . . . Great cold is less frequent and persistent than was believed to be the case at the period of the year dealt with (March 13 to April 19), and is compensated by daily intervals of elevation of temperature, which permit animal life, represented by a fairly large number of species, and including man, to keep up throughout the winter, under endurable conditions." Yet "the water-streak of snow which has melted in contact with a dark object freezes immediately when put into the shadow of the very same object." The solution of political difficulties in Central Asia is not in a practically impossible, and certainly unmain-
tainable, demarcation of the Pamirs, but in the strengthening of the autonomy of the most interesting races that inhabit the series of Circassias that already guard the safety alike of British, Chinese, and of Russian dominion or spheres of influence in Central Asia, &c.

The PRESIDENT said: I think it only remains for me to say that we are all extremely grateful to Mr. Littledale for having brought the Pamir from the region of poetry down to the region of reality. It appears to be an extremely horrible country; if its name does not mean desert it certainly ought to do so, and I think that the moral which was drawn so well by General Strachey, from all we have heard this evening, commanded the general approval of all who listened to it. It is extremely agreeable to me, knowing that there are present two gentlemen from the Russian Embassy, to acknowledge—and it is by no means the first time that a President of the Geographical Society has had to acknowledge—the extreme courtesy shown by the Russian Government to an English traveller.

I am persuaded that you will direct me to tender our most sincere thanks to Mr. Littledale and to Mrs. Littledale, and that you will include in your vote of thanks our Honorary Secretary, Mr. Freshfield, who introduced Mr. Littledale's paper with such exceedingly apt remarks.

Mr. LITTEDALE returned thanks for himself and Mrs. Littledale, and the meeting adjourned.

*A Journey to Garenzanze.**

By ALFRED SHARPE.

Map, p. 68.

IN the latter end of July 1890, I left Mandala, in the Shiré Highlands. My endeavour was to reach Garenzanze, the country of the well-known Central African chief, Mahidi, which lies between Lake Mwero and the Luapula river on the east, and the Lualaba on the west.

The route I decided to take led up Lake Nyassa to its northern extremity, and then across to the Mambwe country near the south end of Lake Tanganyika, where I hoped to obtain carriers who would continue with me for the remainder of my journey. From thence I proposed to go west to Kazembe's on Lake Mwero, cross the Luapula above its entrance into that lake, and make south-west for Mahidi's.

The journey from Matope on the Upper Shire was performed in the African Lakes Company's steamer *Domira*, and after an eight days' voyage I found myself at Karonga Station, near the north end of Nyassa. Following thence the usual route across the Nyassa-Tanganyika plateau, I reached the Lakes Company's station at Chirundamuzi in the Mambwe country, on August 18th. I was there joined by Mr. Stewart Burton (who eventually accompanied me as far as Kazembe's on Lake Mwero). I was disappointed in getting the Wa mambwe carriers I had hoped for, and had to leave Chirundamuzi with less than half the number required, my remaining loads being taken by local men who only agreed to go as far as the south end of Lake Tanganyika.

Abercorn, at the extreme south-east corner of the lake, was reached on August 25th. This station, established by Mr. H. H. Johnston in 1889, has already attracted a considerable trade from various parts of Tanganyika, Ulungu, Itawa, Fipa, &c., and has every prospect of increasing prosperity.

The portion of my route between the two lakes lay through well known country, which has been so frequently described that it is needless for me to say more of this part of my journey. The path traverses plateau land of from 4500 to 5500 feet; the climate is cool and pleasant; carriers are fairly plentiful and good, and carriage cheap.

Leaving Abercorn, we had to skirt the lake to its south-west extremity; at first we kept to the shore, but at Pambeta, left the water and climbed up to the plateau land, about 2300 feet above the lake level. The hills are very steep, and the carriers found great difficulty with their loads, especially in the descent to Kabunda's in the Lofu valley, where we had to let ourselves down the rocks from ledge to ledge with the greatest care. This plateau in its highest parts is about

* A short account of this journey was published in the 'Proceedings' for July last (vol. xii. 1891), and the present paper is the more complete one mentioned at p. 423 as then on its way to the Society.

5000 feet above the level of the sea, is well-watered and well stocked with game, including a few elephants.

Our descent brought us to Kabunda's, where we succeeded with difficulty in procuring men to go even as far as Bwana Teleka's village at Sumbo (or Maika). Between Kabunda's and Teleka's is stony country, and water is very scarce. At Sumbo (or Maika) we were hospitably received by Bwana Teleka himself, and were reinforced by as many carriers as we required. Sumbo is a thriving settlement, and Teleka, a coast man, is subject to Tippoo Tib. There is frequent communication by dhows, between Ujiji and Sumbo. Here we paid off our men from Kabunda's, bid farewell to the lake, and started due west. Our route lay through country which is riverless and in the dry season almost a desert, our only supply of water being obtained from occasional water-holes by the way.

We reached at last the village of Mkula, which is still held by the native tribes in the teeth of the Arab conquest of Itawa, in which country this chief was formerly one of the ruling men. The people were glad to receive us, and invited us into the village, but although I went in, the natives' fear of treachery kept me from seeing the chief. The village is a large one, and is surrounded by a double mud wall, loopholed for muskets, and a deep ditch.

Instead of proceeding westwards I now struck down to the south-west towards Abdallah-bin-Suliman's. His town is built on the site of the Hara mentioned by Livingstone; he himself with other Arabs had travelled with Livingstone, and remembered him well. He is lieutenant of Tippoo Tib for this part of the country, and his power extends eastwards as far as Kabunda's (just mentioned) at the south of Tanganyika. He is a pleasant hospitable Arab, and gave me much information regarding the district through which I proposed to pass. The country is high, about 3300 feet, but I had only passed one stream, the Mwambi, about 8 miles from his town, since I left the lake.

From Abdallah's I started for Kazembe's, having procured all the men I required from Nsama's, which is 15 miles W.S.W. of Abdallah's. Nsama had a large stockaded town and a few villages scattered round. He is the successor to the Nsama mentioned by Livingstone. He and his people are Wawemba, and are the north-westernmost portion of that large and warlike tribe. They live on fairly good terms with Abdallah, but occasionally give him trouble by stealing his people and interfering with his caravans; they fight with spears and have few guns. Throughout Itawa we found the heat very great, and travelling had to be done as much as possible in the early hours. One day from Nsama's we crossed the Mkubwe river, a fine stream, some 15 yards wide, with deep rocky pools frequented by hippos, and with occasional falls; its course was to the N.N.W., and we were told that it ran to Mweru. From the Mkubwe to the Kalongwizi river (two days), we passed

through dry scorched country with little water, reaching the latter river at the confluence of the Movu. The Movu is, however, no longer a river, its bed is quite overgrown and has no water in it except a little swampy portion in the centre. It must have been a large stream at one time. The Kalongwizi we found a deep river, about 70 yards wide, bordered by broad plains on either hand. These are covered with game, zebra, roan antelope, eland, waterbuck, and immense herds of the Vardon antelope. Crossing the Kalongwizi we went due west through uninhabited country, undulating and lightly timbered, to Lake Mwero (Moero), reaching its shores about 12 miles south of the mouth of the Kalongwizi river. The shore here (and, as I subsequently found, throughout two-thirds of its whole extent round the lake), rises abruptly from the water's edge to a height of from 150 to 200 feet, above which is undulating country.

Travelling parallel with the lake, but keeping a little way inland, we reached in two days the northernmost of Kazembe's people, and here we passed out of a dry country into one well watered with streams, and with swamps in every hollow, and having green leaves and grass everywhere. We reached Kazembe's town on September 29th, and pitched our camp a short distance from the stockade. From here, Mr. S. Burton returned to Tanganyika, and the remainder of my journey was made alone. After keeping me waiting a day, Kazembe received me in great state; he was dressed in marvellous costumes and carried by twelve men in a large square box on poles, the box was covered with leopard skins, and the chief was shaded by an immense red and white umbrella. His big wooden drums kept up such a constant drumming that little else could be heard. The "official reception" over, I was taken to Kazembe's house, and we discussed the news. When I told him that I intended to cross the Luapula and go on to Mshidi's, he would not hear of it, as they are bitter enemies; and no amount of reasoning could convince him that I must go on. I decided to take my own course, and start the following day. All but seventeen of my men, however, refused to go on, and deserted. I therefore started with seventeen only, hoping to obtain canoes somewhere up the river. Kazembe sent on messengers up the banks of the Luapula forbidding the people either to sell me food or let me have canoes. When a native chief decides that one shall not do a thing, it is often very difficult to break through the barriers interposed by him. Carriers become afraid and desert, and even those who stick to their master lose heart, and hunger often completes what intimidation has begun. A chief's reasons may be jealousy, very commonly he is on bad terms with other chiefs one desires to see, and in any case he finds it hard to understand why, with no reason apparent to him, one should desire to go at all, and above all why one should be in such a hurry. For two days, some 42 miles, I followed up the river, I was everywhere met with refusals of food or canoes, and then in the

early morning all but seven of my men deserted: I pushed on with these, hoping to cross the Luapula higher up, and reach Mshidi's in six or seven days. Once there I hoped to get cloth from European missionaries to carry me back to Nyassa. Finding it impossible to get a canoe, I left the river bank and going some miles back into the forest, stripped the bark off a large tree, and patched up the ends, hoping to use it as a canoe. This we carried down to the banks at night, but it leaked too much to enable us to cross in it. I therefore gave it up, and being entirely without food decided to return to Kazembe's and endeavour to come to some arrangement with him. The Luapula here is from 250 to 300 yards wide, deep, and running with a slow current of about one mile and a half per hour. Its banks are lined with palm trees and there is much game, mostly Vardon antelope. This antelope, which is so common in these parts, is unknown in the countries bordering on Lake Nyassa. It stands about three and a half feet at the shoulder, is reddish in colour, with rather long hair, and has lyre-shaped horns; it goes in herds and is a great leaper, wherever the foremost jumps they all jump, like sheep. On returning to Kazembe's, I was received with open arms, as he thought I might have come to harm, and that trouble would come to him. He now said I should cross, not up the river, but to Chilwa Island, and thence to the opposite shore; he accordingly sent me north with men of his own as guides.

Some way above (south of) Kazembe's, the Luapula divides, the larger portion going west of a long low island; a small portion running east of it, into what is known as Mofwe. The western portion is called Luapula. Mofwe is not a river, but a shallow arm of the lake, in some parts four or five miles wide, narrowing in others to a mile. The island is covered with palms, is uninhabited, and is called Chisi (or Kisi). At the northern termination of Chisi, the Luapula may be said to actually enter the lake. The Island of Chilwa (or Kilwa) lies in the lake, some three or four miles north of Chisi, and is distant from the eastern shore of Mwero some three miles. Chilwa has two hills on it. I followed the shores of Mofwe for 20 miles after leaving Kazembe's, until I reached a point (opposite Chilwa) where the lake shore turns to the north-east. Here I was to get canoes to take me to Chilwa; but none were forthcoming, and after two days' delay it became evident that Kazembe had never really meant me to cross. The Kazembe whom I saw is the same who was in power at the time of M. Giraud's visit: I found him friendly, intelligent, fairly reasonable in his demands, and no more grasping than most other African chiefs. Beyond the difficulties I had with him about proceeding to Mshidi's, I had no troubles with him, and on my departure he gave me a 40-lb. tusk.

Finding it impossible to get to Garanganze through this country, I started back for Abdallah's, to try for men from him to go to the north end of Mwero, and, crossing the Luapula at its exit from the lake to

travel south-west from there to Mshidi's. I returned to Abdallah's by a slightly different route, and on arrival there, after some delay and trouble, I succeeded in getting fourteen men, and more from Nsama; and made once more a start.

Fourteen miles west of Nsama, I reached and crossed the Mkubwe river, which running north, entered vast marshes, and I here solved a question which had puzzled me for some time past, viz. as to where the Mkubwe and Mwambezi rivers ran to. I had hitherto been told that they ran into Mwero. As I was now to the south-west of both these rivers, and on my way to the north end of Mwero, it was evident that if they ran into the lake I should have to cross them both again. This I was however told was not the case; that the Mwero into which they ran was another Mwero. I then ascertained that the Mkubwe from the south, the Mwambezi from the south-east, the Chisela from the north-east, and the Choma from the north, all ran into a salt lake also called by the natives Mwero; that this is the remnant of a much larger lake which formerly had its outlet at the south-west end by the Movu river-bed to the Kalongwizi river; that this lake was now a vast marsh, with open water in stretches all over, and with a large piece towards the centre some ten to fifteen miles in diameter. I decided to visit it on my return journey if possible. At the village of Chipembiri I crossed the Movu river-valley, down which the waters of the lake originally had their outlet. Where I now crossed it, at its exit from the old lake, there were large patches of marsh, smelling strongly of ammonia, and I was told that in occasional years, after a heavy rainy season, a little water found its way down the valley to the Kalongwizi. On October 20th I reached the north-east corner of Lake Mwero, and following the northern shore for four or five miles, struck north and crossed the Luao river some five miles from its entrance into the lake.

Immediately after leaving Chipembiri, which by the aneroid was (on the level of the swamp) 3050 feet above sea-level, we had commenced a steady rise; the highest point on the road between the old lake and the real lake Mwero, being 3850 feet. The eastern watershed of the latter, along the upper half of its length, is never more than six or eight miles away from its shore. Eight miles beyond the Luao, I crossed the Luchinda (Lokinda) and turning due west travelled seven miles to the town of Mpweo. The country lying north of Mwero consists of undulating plains covered with stunted forests and thickets; there are many signs of former occupation, but now, with the exception of two villages of Abdallah's Rugaruga, between the Luao and Luchinda rivers, there are no inhabitants. These two rivers Livingstone describes as some forty yards wide, but this was in the middle of the rains. At the time of my crossing, they were each about twenty yards wide, deep and muddy, and swarming with crocodiles; the Luao is crossed by a very creditable wooden bridge erected by the Rugaruga.

The Luchinda has to be forded, and at the time of my crossing it on my outward and subsequently on my return journey, was about five feet deep.

Mpweto was at one time a chief of some importance in these parts, and was subject to Nsama: now, however, he is quite in the hands of the Arabs and calls himself 'Abdallah's child.' At the time of Livingstone's visit, Mpweto's town is described as being one mile from the Luapula. It has now, however, evidently been moved to the eastward, as I found it fully five or six miles away and a range of hills between the two. On leaving Mpweto, I expected to have crossed the Luapula due west from the town, but was taken south, and reached the river at the point of its exit from the lake. I found it here a smaller river than it is south of Kazembe's, before it enters the lake. The width was about 200 yards, the bed rocky and not deep. As soon as I had crossed the river, the path led up a steep ascent on to a ridge, and I found that the river takes a peculiar course after leaving the lake. It flows for three miles S.S.W. parallel with the shore; the ridge, some 300 feet high, dividing the two; the path runs along this ridge, which has a steep descent on each side, and I overlooked the lake on the left hand and the Luapula on the right. Two miles after leaving the lake the course of the river is broken by rapids, which continue, according to native information, far down its course. After running three miles S.S.W. the Luapula takes a sudden turn to the west, and then apparently to the north. It runs through steep rocky gorges, which it has cut for itself through the rugged mass of mountains lying north-west of the northernmost corner of Mweru.

On leaving the Luapula, I followed the lake shore south for a day, and then crossed over the northern bit of the large elevated plateau lying west of Mweru and the Upper Luapula. It only took me one day to cross, though farther south the plateau is much wider. The highest point was 4400 feet, the height of Lake Mweru being, by my aneroids, 2900 feet. Leaving the north-western edge of the plateau, I came to Chuako, a small town subject to Mpweto; after which the whole country is subject to Mshidi. From Chuako I followed for many days the base of the steep rise to the elevated plateau, the path being generally near to the Lovule river. This river, which joins the Luapula not far from its exit from Lake Mweru, I crossed three times, first at the village of Chifwambula, again the following day, and later, on its leaving the plateau; on its lower parts it is a deep muddy river some 25 yards wide; but where it comes down from the plateau to the lower country it is a mountain stream of clear water. From Chifwambula, messengers were sent on ahead to advise Mshidi of my coming, and as the distance is eleven days' hard travelling, it will be seen how far Mshidi's power reaches. The height of Chifwambula village is 3100 feet. From here to Ngele, the next village (two days), we gradually and imperceptibly

rose to 3600 feet, and thence, always skirting the rise to the plateau, very gradually descended, having now the Luvua river on the right hand. From Ngele on to Kifuntwe the mountain wall on the left is extremely steep, has an abrupt edge, and is apparently table-topped. In places great buttresses stand out, and there are horizontal strata of rock traceable for miles. The Luvua river eventually joins the Lufira a few miles above the junction of the latter with the Likulwe.

After leaving Ngele, I reached the village of Maroa, and then Kifuntwe, crossing on the way the Mpango and Luiki rivers, which descend from the plateau and join the Luvua. The Luiki has a fine fall from the edge of the plateau of fully 200 feet before striking rocks. The edge of the plateau here appears to be about 1500 feet above the lower country. At Kifuntwe the Luvua is joined by another stream, the Luizi. Crossing the Luvua here by a wooden bridge, I left the mountain wall and struck across the plains to the Lufira river, seeing vast quantities of game on the way. Where I reached the river it was about 45 yards wide, muddy, and flowing at two miles per hour. I followed up its right bank to the junction of the Likulwe, then crossed in canoes, and ascended the latter river to Kagoma, fording it at Mirambo's, and recrossing a few miles further up. The Likulwe has cut a deep bed for itself through these plains; in many places the stream is 25 feet below the top of the banks. The soil is rich; tomatoes grow wild in great quantities. In these plains, when once the river banks are left, water is scarce. I left a small stream running into Likulwe early on November 8th, and travelling 20 miles reached Mshidi's own town that evening, after one of the most trying marches I have ever had. The sun was terrible; the country shadeless and waterless. Mshidi's town is situated between two peaks rising from the plain, and is generally known as Kumpata. (This is, however, simply the two words Ku-mpata, meaning "at the pass.") Mshidi's name is differently pronounced in different parts: Mshidi, Msidi, Meiri, &c.

Mr. F. Arnot's mission-station is situated a mile south-west of the chief's village, on a hill overlooking the plains to the north. Here I found two European missionaries, Messrs. Swann and Faulkner, and a few days after my arrival, three more came in from Benguela, on the west coast.

Mshidi I found fairly well disposed to me, but very suspicious, and firmly impressed with the idea that any parties coming from the east were doubtful customers. This was, he told me, because the only people who had hitherto come thus had shown themselves to be his enemies, and he instanced Reichard, the German traveller, who he asserted had fought against and killed his people; also Naama's people, and various Arabs and coast men. He is now doing most of his trade with the west. He is constantly at war with Kazembe of Mweru, and with Simba, a

coast man established on Kilwa Island (in Mwero); also with Mere-mere and the Waussi of the western Bangweolo districts. At the time I was there, he also had a large war party in Urua. Mshidi is now an old man, and there is no one to succeed him at his death. He trusts none of his subchiefs, and is very severe in his government; his own stockade was plentifully decorated with human heads. The number of his wives is great.

Throughout all these countries south-west of Lake Tanganyika, maiming is very common; the Wa-Wemba are perhaps the worst; but throughout the countries of the Wa-Wemba, Wa-Lunga, Wa-Lunda, and Wa-Garenganze, one constantly sees men and women without ears, hands, noses, fingers, lips, &c. Mshidi himself is a Wa-Nyamwezi; he came originally to Garenganze on a trading journey, settled there and became chief; he has gradually built up a large kingdom, and his power is felt far in all directions. There are settled with him many Baluba from the Kasai river, also coast men from the east, and a few Wa-Nyamwezi.

North of Mshidi's the country is all vast plains, but to the south towards Katanga it is hilly. The Katanga copper-mines are two days south, gold also is found in that district. I was told that the Lufira was deep and navigable from a point about E.S.E. of Mshidi's town, down to rapids a few miles below where I first struck it. I could get no reliable information as to the navigability, or otherwise, of the Lualaba.

I had hoped to make my return journey to Nyassa round the south end of Bangweolo (called at Mshidi's "Vemba"), but the chief insisted on my returning to the north. I then tried to get east, so as to cross the Luapula a little above Kazembe's, but Mshidi was determined that I should only return by the way I had come, and sent his men to accompany me some way and see that I did so. I crossed the Lufira once more at its junction with the Likulwe, and then struck across to the Luvua and followed that stream up to Kifuntwe; it runs through plains covered with game.

From Kifuntwe I followed my outward route to Ngele, and then climbed the rise to the plateau and went east, intending to strike Mwero and follow up its west shore to the north end. On turning off my old route the Wa-Wemba carriers (Nsama's men) threw down their loads and disappeared, having previously declared their intention of doing so if I left the old road, as they said there were no inhabitants on the way to Mwero or up its shores, and consequently no food. As I had now very few (and small) loads, I managed to distribute the discarded ones among Abdallah's men who were still with me, and proceeded on my journey. The Awemba had not looked for this, and presently came on behind and begged for their loads. I agreed to take them back without loss of pay if they all came up and took their punishment, which they did, and worked merrily and contentedly after-

wards. As I had been unable to get any one to come as a guide, I took the first path running in an easterly direction, and after travelling four miles east by north, struck the Luvule river, where we slept. There was a little stockaded village on the river, but the people would give us no information about roads, nor even approach us at all. Throughout this country west of Mwero the inhabitants are extremely suspicious, and appear to look on all strangers as probable enemies. No amount of conciliating or reasoning will induce them to be friendly. They are determined that you have come to harm them, and nothing you say or do will persuade them to the contrary. Probably they have had no opportunity of learning yet that most white travellers do not come with war.

From Ngele to the Luvule we rose 300 feet, the crossing of the river being 4000 feet. Travelling slightly south of east we crossed the Luvule twice the following day and camped at 5100 feet. The plateau is mostly covered with scanty forest, but here and there we came on large open spaces of short grass. Beyond an occasional roan antelope, we saw no game. I was surprised to find tsetse-fly up to the highest parts of this plateau. All Itawa, Lunda, and the country west of Mwero swarm with tsetse. On the following day I reached the highest point on the plateau, 5400 feet, and at once commenced the descent to the low country bordering on Mwero's south-western shore. From the top I had a magnificent bird's-eye view of the southern portion of the lake and Kilwa Island. The lake appeared to be not over ten miles away, but proved to be double that. Mwero has none of the wide expanse to the south-west as shown in existing maps. From a point due east from where I stood, it gradually contracts to the entrance of the Luapula river. I was too far away to distinguish actually where the river might be said to end and the lake begin. There is only one island in Mwero, Kilwa, which lies about equidistant from the east and west shores, apparently three or four miles from each. Kilwa has two hills on it, is seven or eight miles wide from east to west, and was described to me as being very fertile. Kisi, the low island in the Luapula, is marshy and is said to have oil-palms on it.

Simba, a coast man who has lately settled on Kilwa, makes constant raids on Mahidi's north-eastern villages. Descending from the plateau I camped on the low undulating country which borders Mwero's south-west shores. From the foot of the mountains to the lake shore was 15 miles. I reached the lake at a large marshy plain where I found much game, also spur-winged geese, ducks, and snipe. Crossing the plateau and to the lake there were no inhabitants, and it was not till five days after I reached it that I again came to villages. Three miles along the lake shore (to the north) from where I reached it, the flats ended, and thence, all the way to the north end, the lake was bordered by abrupt cliffs from 150 to 200 feet high; the country above the cliffs being

wooded, undulating, and abounding in game. At the time I was there, water was plentiful, but possibly scarce in the dry weather, as no streams of any size enter the lake. I found it best to travel above the cliffs, as the lake shore itself was very rocky; as a rule, there is no flat ground between the lake and the foot of the cliffs, but here and there at the mouth of the small streams, deltas of rich soil, containing from one to thirty acres, have been formed. On December 3rd I reached a few native huts built on one of the small deltas, but before we could reach them the natives had fled. As my carriers had eaten nothing but meat for a week or more, it was a difficult matter to keep them from helping themselves to anything they could find. On December 4th I reached the small stockaded village of Chipungu, subject to Mpweto, and was at length able to buy food for myself and the carriers. Fish, eggs, cornmeal porridge, tomatoes, &c., were luxuries. From Chipungu to the Luapula was one day's journey, the country being overrun by herds of buffalo and zebra, also sable antelope, vardon, pigs, waterbuck, bushbuck, &c.

From the time I left Mshidi a constant rains caused much discomfort. Arriving at Mpweto's on December 6th, I left on the following day, and retraced my outward route to Chipimbiri's, whence, sending on all but a few carriers to Abdallah's, I went myself with five men to see what I could of the old lake-bed called also Mwero. Following the southern shore of the old lake for some distance, I crossed to a large wooded island, wading thigh-deep in swamp. As we walked, the surface of the swamp went in waves, like thin ice, and with a fifteen-foot bamboo pushed through the matted vegetable surface we touched no bottom. Reaching the island, we travelled up its western shore to its northernmost point, the distance (following the bays) being some nine miles; the island is three to four miles wide (from east to west). I have never before seen such vast quantities of buffaloes as there were along the flats bordering on the swamp; immense herds numbering thousands blackened the flats. Also zebra in great quantities. Lions were numerous on the island. From a small hill at its northern point I looked up the marsh to the N.N.E.; it reached to the horizon; on the south-east and north-west it is bordered by mountain ranges, the width of the old lake being about fifteen miles. Here and there I saw large patches of open water glistening in the sunlight, and numerous small pools; in these were hippos. I was told by the natives of Chipimbiri that the Choma, which runs into this marsh from the north, is a larger river than the Mkubwe. In addition to the four rivers which run into Mwero swamp, there are said to be numerous local torrents from the hills which only run during the rains. All the water is salt and undrinkable. In a pool at the northern point of the island I found sixteen hippos, and as the people of Chipimbiri village were in a state of famine, I sent back messengers to tell them to come for meat. I shot eight hippos, and the

following day some hundreds of men, women, and children arrived to eat and carry away the meat. During the two nights I slept there many lions were roaring round the camp. In no part of East Africa have I seen such great quantities of game as there are on the edges of the Mwero swamps. Returning to Abdallah's, I went on from there in an easterly direction till I struck the Lofu river two days journey above Kabunda's, and followed it down to Liendwe where I joined on to my old route. From where we struck this river down to Kabunda's the valley is now uninhabited, and occupied only by game and a few elephants. Our route in some parts was very bad, the path running alongside the river's edge among boulders and rocks of all sizes. The hills on each side of the river rose steeply up from the water's edge. The Lofu was full and unfordable, and we had to obtain canoes to cross at Kasingere's village, near Kabunda's. I arrived at Abercorn Station on Christmas Day, and from there crossed to Karonga and came down Lake Nyassa by steamer, arriving once more at Mandala in the Shire Highlands on February 14th, 1891. On my journey across from Tanganyika to Nyassa, I was accompanied by Mr. Nicoll, of the African Lakes Company, who was on his way to England. While at Mwenzo, half-way between the two lakes, we made a short journey north to the town of Chikanamalira, the paramount chief of the Wa-Nyamwanga people. Our road took us to Mzwilo (or Mzwaro), and thence due north through the Chingambo Hills to the north-eastern edge of the Tanganyika-Nyassa plateau, the country well watered and wooded, with an almost bracing climate. From the edge of the plateau there is a steep descent of 1700 feet to the valley of the Mkana river (running to Hikwa Lake). The Mkana valley is swampy and hot. Chikanamalira's town is on the bank of the river, and has a strong stockade and ditch. He is frequently at war with the Hikwa people.

While passing, on the Tanganyika-Nyassa road, the sources of the Chozi or Chambezi river, I was struck with the smallness of fall there must be from its sources to Bangweolo; the Kalisi, one of its principal sources, at the point where we crossed it, was 4400 feet by my two aneroids. I see in Bartholomew's last map of Central Africa, Bangweolo is stated to be 4200 feet. If therefore this is correct there is only a fall of 140 feet from the sources of Chambezi to the lake, which would seem to show that this river is probably navigable for the greater part of its course. Some Wa-Wemba I met from Mchewe (Mkowe) told me that canoes travelled long distances down the river, but none of them knew anything of its entering any large lake.

Throughout the countries traversed on my journey, elephants were very scarce, but still the supply of old ivory seems to be fairly plentiful. There are however many natural products which only await European energy and a firm administration to develop. Rubber especially is found everywhere throughout Nyassaland and the countries bordering

on Tanganyika and Mwero. Wax is found in large quantities in the Mwero countries. Hitherto war, the African bugbear, has prevented any development in these regions.

GEOGRAPHICAL NOTES.

Educational Lectures.—The Council of the Society have come to the conclusion that it would be carrying out one of the objects for which the Society was founded—the diffusion of geographical knowledge—if occasional courses of lectures of an educational character were given in connection with the Society. The date at which these will begin has not been decided upon; it may be in the spring, but more probably in October of this year. Mr. H. J. Mackinder, Reader in Geography at Oxford, will be the first lecturer. It is hoped that the services of other specialists in geography may be obtained for subsequent courses, and that the series will be continued each session. Details of the arrangements will be published as soon as they are settled.

Orthography of Geographical Names.—A circular has been prepared by the Orthography Committee of our Council, and is now being issued, explaining the rules for spelling the native names of places more fully than was done in the first circular, published in the 'Proceedings R.G.S.' 1885, p. 535. The success of the system so far has been much greater than had been anticipated. All charts and maps issued by the Admiralty and War Office since 1885 have been compiled and extensively revised in accordance with it. The Foreign and Colonial Offices have accepted it, and the latter has communicated with the Colonies requesting them to carry it out in respect to names of native origin. And further, the Government of the United States of America, after an exhaustive inquiry, has adopted a system in close conformity with it.

A Southern Source of the Nile.—The interesting news has reached Berlin that Emin Pasha and Dr. Stuhlmann, who have been exploring together the little-known region lying between Lakes Victoria, Tanganyika and Albert Edward, have discovered a river named Kifu, which flows into the south end of Lake Albert Edward. The river is conjectured to rise in Uhha, about 4° S. lat., and to have a length of about 250 miles. There is a conjectural Lake Kifu lying between Lakes Tanganyika and Albert Edward, and it is possible that this may really be a portion of the river. It is possible also that Lake Akanyuru or Alexandra Nyanza, placed by Stanley from native report, may have to be removed, and the Kagera river reduced in length. But on these points we must await detailed information from Emin. Whether the Kifu is the most southerly source of the Nile also remains to be proved, for it is evident that Emin has not himself traced it to its origin. Moreover, in the

most recent map of Eastern Africa, just issued by Kiepert, a river is indicated as flowing into the south shore of Victoria Nyanza, which has its source in 5° S. lat. Still Emin's discovery fills up an important blank in our knowledge of the geography of the region between Lakes Tanganyika and Albert Edward.

The Great Australian Expedition.—This important expedition, the organisation and objects of which were announced in the 'Proceedings' of the Society for last June (1891, p. 364), has succeeded in traversing, from north to south, the first or most southerly of the three great blanks it was commissioned to explore. This is the wide interior space lying between the track of Forrest in 1874 and that of Giles in 1875. The party crossed the boundary between South and West Australia, at a point to the east of Fort Müller, in lat. 26° 10' S. and long. 128° E., and struck south across the desert from Mount Squires, making for Queen Victoria Spring, on Giles's track of 1875. Arriving at that expected abundant water-supply, they found it nearly dry, and all hopes of a thorough exploration of the region were destroyed. Under these circumstances, and sorely straitened for water, a direct route was taken for the nearest cattle stations near the southern seaboard of West Australia and Esperance Bay, from which latter port Mr. David Lindsay, the leader, despatched reports of the expedition to Adelaide in October last. The country traversed appeared to have had no rain for two years. Owing to admirable management on the trying march of 560 miles through an almost waterless country, the health of the party had not suffered, and only two of the camels had died. Notwithstanding the utter aridity of the region, Mr. Lindsay remarks that it cannot be called a desert, for the country is more or less clothed with bushes and trees, and for many miles there is a gum-tree forest which extends into South Australia, the trees reaching often 3 feet in diameter and 40 to 50 feet in height. He adds that the clean white trunks and dark-green tops of the trees from a short distance present a charming aspect, but that a nearer examination reveals the usual signs of aridity, the ground being covered with nothing but the desert-loving spinifex and useless shrubs. Mr. E. A. Wells, the surveyor of the expedition, reports that the whole of the country travelled over from Mount Squires was inhabited by natives who got their water supply partly by draining the roots of certain mallee trees, some of which, distinguishable only by the keen observation of a native, yield quantities of pure water. It was Mr. Lindsay's intention to remain near the south coast for some weeks to restore the strength of the sorely-tried camels, and then to proceed again towards the interior, taking a more westerly route, so as to cross Giles' route at Ullaring, and Forrest's track at Mount Ida, and thence on to Hope's Station viâ the new gold fields. From the last-mentioned place he had hopes of making an excursion south east as far as latitude 28°, and thus completing sufficiently the examination of the first great area it is the

object of the expedition to explore, before proceeding to the second, further north.

The "Grand" Falls, Labrador.—These magnificent falls, of which very little was known, and which the enterprising English traveller, Mr. R. F. Holme, failed to reach on his journey inland in 1887,* were last summer visited by Mr. H. G. Bryant, of Philadelphia, accompanied by Prof. Kenaston, of Washington. The difficult land journey from the end of canoe navigation on the Grand River was successfully accomplished, and sufficient time spent at the falls to make accurate measurements, for which instruments had been supplied to Mr. Bryant by the United States Geological Survey, and also to make botanical and geological collections and secure a series of excellent photographs. The width of the falls was found to be 200 feet, the river contracting to this width from its previous expanse, half a mile back, of 400 to 500 yards; the height of the perpendicular fall of water is 315 feet, but before the vast volume leaps over the edge it rushes down a series of slopes, which together make the entire descent 500 feet. Another party of explorers, of which Mr. Bryant heard only on arriving at Halifax, were in the field at the same time—Prof. Lee, of Bowdoin College, with some twenty students and graduates—and a visit to these falls formed a feature of their programme. The schooner in which they were embarked reached the mouth of Grand River first, and two of the students succeeded in reaching the falls a few days before Mr. Bryant. In an article on Mr. Bryant's expedition, contributed by Mr. M. Harvey to the *New York Tribune*, it is pointed out that the first white man who reached the Grand Falls was John McLean, of the Hudson's Bay Co., whose journey was made in 1830, and an account of it published in a book, now rare, entitled 'Notes of a Twenty-five Years' Service in the Hudson's Bay Territory.'

Formation of a Liverpool Geographical Society.—We are glad to be able to record that, under influential auspices, the first step was taken for the formation of a Geographical Society in Liverpool, at a public meeting held there on the 7th of December. The Mayor presided, and was supported by a large number of the most prominent citizens of Liverpool. Letters were read by the Secretary from the Hon. G. N. Curzon, M.P., and others, warmly supporting the establishment of such a Society, while Mr. Douglas Freshfield wrote, assuring the Secretary of the sympathy of the Royal Geographical Society. Mr. A. B. Forwood, M.P., presented the motion for the formation of a Geographical Society in Liverpool. In doing so he insisted on the importance of geography to politics and commerce. Had our statesmen been better acquainted than they were with the geography of Africa in past years, our commercial position there might have been much better than it now is. Mr. Forwood

* 'Proceedings R.G.S.,' 1888, p. 189.

believed that a society with practical aims, such as the Liverpool Society would set before it, might do great public service. Among other things they might tap the many captains who were daily arriving in Liverpool from all parts of the world, and who, if encouraged, might render service to geography as well as to commerce. Mr. E. Lawrence, in seconding the resolution, said:—"To a community such as Liverpool geographical science must be the means of furnishing power of the greatest possible utility. Accurate geographical knowledge meant in a commercial community economy in and expansion of commerce, and therefore anything they could do to further that object was a great work towards the increase of employment and of the social and intellectual comfort of the people." The motion for the formation of the Society was unanimously carried, and a council appointed, with the Earl of Derby as President and the Mayor as Vice-president.

The Geographical Society of Lima.—The foundation of a Peruvian Geographical Society was a favourite project of our late Corresponding Member, Don Manuel Pardo, and he actually established one while he was President of Peru, with himself as President, and the learned General Monduburn as Vice-President. But the Chilean invasion swept away all institutions of the kind, during an interval of some years. A Geographical Society of Lima has again been organised under the best auspices, and it commenced work on the 15th of April, 1891. It is officially attached to the Peruvian Foreign Office, and will receive a small monthly subsidy from the Government. Its main object will be to publish information respecting the geology, orography, climatology, hydrography, and statistics of Peru; and monthly 'Proceedings' have been issued since last April. An important duty devolved upon the Society almost immediately upon its institution, owing to the lamented death of Don Antonio Raimondi, who left his great scientific work on Peru incomplete. That eminent physicist left behind him a very large collection of maps, manuscripts, and specimens, and, at the request of the Government, the Society appointed a Commission, consisting of five of its members, to examine the geographical materials left by Raimondi, and to report to what extent they could be utilised. Their first work has been the preparation of a classified inventory. The 'Proceedings' of the Society have contained several articles of scientific interest, including one on the curious phenomenon known as "Callao painter," by Señor Raimondi, others on the River Purus, on the geology of Huanta, on the Amazonian provinces of Peru as a field for immigration, on the subsidence of the waters of Lake Titicaca, and on the regions of South America which remain to be explored. The President is Don Luis Carranza, a physician and a close observer of nature. He is the author of some thoughtful essays on the effects of climate on human life, and on the character and genius of the Inca Indians. His contributions to the 'Proceedings' of his Society

have been an excellent topographical description of the field of battle of Chupas, in which the younger Almagro was defeated, an account of a journey in the Andes, and a very able paper on the influence of the orientation of Andean valleys on the phenomenon called *heladas*. The Secretary of the Society is Don Gavino Pacheco Zagarra, a learned philologist, whose elaborate work on the Inca drama of Ollantay was published at Paris in 1878. The Geographical Society of Lima has begun well, and with every prospect of a useful career. There is plenty of most valuable work to be done within the limits of the republic, and the way in which operations have been commenced gives promise of progress in the right direction.

CORRESPONDENCE.

Geography of the Pamir.

ORIENTAL CLUB, HANOVER SQUARE, W.
14th December, 1891.

SIR, — Apart from the momentous questions that turn on the political geography of the Pamirs, it is surely a matter for great regret that the 'Memoir on the Indian Surveys 1875-80,' just published by order of Her Majesty's Secretary of State for India in Council, should give further currency to an exploded blunder in respect to the course of the Upper Oxus. In Sir H. Rawlinson's 'England and Russia in the East' (2nd edition, p. 319, it is stated that "in reality the main stream of the Oxus appears from Colonel Gordon's inquiries to be the river which rises in the Little Pamir lake, running in the first instance to the east, then turning to the north-west and circling round the elevated plateau of the Great Pamir, from whence under the name of the Murghabi it flows down the Shiguan valley, and unites with the southern branch of the Oxus at Wamur." But in the India Office 'Memoir' (p. 143), it is stated that the Mahomedan traveller M—— S——, in 1679, "ascended the Bartang or Murghabi to its source in the Sarez Pamir." These two statements are utterly incompatible. I beg to point out, however, that the inaccuracy of the report made by M—— S—— was exposed at a meeting of the Royal Geographical Society in 1884. On p. 507 of the 'Proceedings' for that year a paper will be found written by General Walker, and read at the meeting by Colonel Hoddich, in which the following passage occurs:—"Last year a Russian officer, Captain Putiat, accompanied by the topographer Bendersky, followed the course of the Aken down to Sarez, and found that the river merges into the Murghabi, thus showing that M—— S—— must have been mistaken." Nor is this the only blunder which is allowed to pass without comment as authentic geography in the India Office 'Memoir.' A few lines lower down it is stated that M—— S—— also visited the Ghazkul lake, "which some suppose to have a double outlet into the Ishkaman and Mastuj rivers." No one who reads the 'Proceedings' of this Society can have supposed anything of the kind for many months past. In the 'Proceedings' for February 1890, Colonel Woodthorpe writes:—"M. Dauvergne tells me that instead of one there are two lakes, and that from the smaller, named Gazkul, flows the Yarkhun (or Mastuj) river, while a lake, the Karambar Sar, gives rise to the Karambar or Ashkaman river." Colonel Woodthorpe adds that it had always seemed to him, from what

was known of the nature of the country, very improbable that a lake in this region could have two outlets. "It can only have been due," he says, "to a misunderstanding of native information, or misrepresentation, that the notion of a double outlet can have arisen."

I am, sir, your obedient servant,

To the Editor of the Proceedings, R.G.S.

STEPHEN WHEELER, F.R.G.S.

The foregoing letter having been referred to General J. T. Walker, R.E., as one of our chief authorities on the geography of the region referred to, he has communicated the following note:—

Mr. Stephen Wheeler has certainly hit on two slips in Mr. Black's recently published Memoir on the Indian Surveys 1875-90. For the first and most important of these slips I may be in some measure responsible, for I received a considerable portion of Mr. Black's proof sheets for revision, and I may possibly have received the sheet in which it occurs; I do not remember having done so, and if I did the passage did not catch my eye, or I would of course have corrected it. The Indian explorer M—S— did, as a matter of fact, ascend the Murghabi river, and he reached a point in the Sarez Pamir which he believed to be its source, and which must have been a source of the river; but we now know that "it was not the principal source, and that he must have left the main stream and gone up one of the northern affluents of the river. A short time afterwards the Russian explorers Captain Putiaty and topographer Bendersky ascertained by actual survey that the Aksu river flowed into the Murghabi and was its principal source, as had always been believed to be the case until M—S— supplied the erroneous information he had obtained in the course of his travels.

In the interests of accurate geographical science, it is of course to be regretted that M—S—'s error is not pointed out in Mr. Black's Memoir, for the Murghabi is now established as a river of much greater importance than is to be inferred from M—S—'s report. It is now known to be longer than the Panja river, and it must therefore be considered as having a preferential claim to that river to be considered the principal source of the Oxus in the Pamir plateau. But surely no momentous political matters should reasonably be allowed to turn on such obscure and doubtful questions as those in which the geography of the Pamirs has long been involved, and which still require much careful elucidation to become sufficiently definite for the requirements of political geography.

J. T. WALKER.

Obituary.

Mr. Frederick Drew,* F.R.S., F.R.G.S., who died at Eton on October 28th, had been a Fellow of the Royal Geographical Society for nineteen years. He was born August 11th, 1836, at Southampton, where his father kept a well-known private school, and at this school he was educated until he was seventeen years of age, when he entered the School of Mines, at that time (1853) recently established in the Jermyn Street Museum. At the School of Mines he distinguished himself, although younger than some of the other students, by taking all the prizes offered, including the Duke of Cornwall's Scholarship, a Royal Scholarship, and

* By W. T. Blanford, F.R.S.

the Edvard Forbes prize, the last two for the first year in which they were awarded.

In 1855, on leaving the Royal School of Mines, Frederick Drew joined the Geological Survey of Great Britain, and remained on the staff till 1862, being chiefly engaged in the south-east of England. His principal contributions to science during these seven years included an important paper on the Hastings Sands, published in the 'Quarterly Journal' of the Geological Society for 1861, and an account of the geology of Folkestone, Rye, and Romney Marsh, which appeared in the Geological Survey memoirs. The subdivisions of the Hastings Sands proposed by Drew have been accepted by the Survey and by British geologists generally, and he introduced some modifications of much value in the classification of the lower cretaceous beds throughout the Wealden area.

In 1862 the Maharaja of Kashmir desired to have the services of a geologist to report on the mining wealth of his country, and the appointment was accepted by Drew, who remained for ten years in Kashmir. At first he was, nominally at all events, engaged in mining research. It is but natural that the ideas of an Indian Maharaja and those of a European geologist as to the methods and objects of such inquiries should differ materially, and it is not only highly creditable to Drew, but rather remarkable that, despite the inherent difficulties of his position, he should have impressed the Maharaja and his advisers so favourably as to be appointed first to the governorship of Jammu, and subsequently to the still more important one of Ladák. There can be no question that his skill and tact in dealing with natives of India, and his even temper and coolness in emergency, led to his being entrusted with the important posts that he filled.

The principal results of his residence in Kashmir, and of the exceptional opportunities he enjoyed for seeing the country and its inhabitants, were communicated to the public in his well-known work on Jammu and Kashmir published in 1875. The greater part of his geological observations were necessarily reported to the Kashmir Government alone, but some purely scientific notes on the alluvial deposits that occupy so enormous an area in the Upper Indus Basin, as in other parts of Central Asia, were communicated by him to the Geological Society. A large portion of this paper is an account of the physical geography of the country, and describes the land contours and their mode of origin in Ladák and other parts of Kashmir territory, whilst the work on Jammu and Kashmir is a storehouse of geographical and ethnological data, of which later writers have frequently had occasion to avail themselves. The work is well-written and extremely interesting. An abridged edition was published by the author in 1877, under the title of the "Northern Barrier of India."

The only communication to the publications of the Royal Geographical Society that appeared from Drew's pen was his description, in a letter to Sir Roderick Murchison, of the steps taken, under instructions from the Maharaja of Kashmir, to ascertain the circumstances attending the murder of Mr. Hayward, the well-known explorer of the countries lying north of Kashmir. Mr. Hayward, who was a medallist of the Royal Geographical Society, was killed when on his road to the Pamir, by Mir Wali of Yassin, chiefly, it appears, for the sake of plunder. The whole of the circumstances were ascertained by Drew, and an unfounded suspicion that at one time existed against the Kashmir Government was dispelled.

After returning to England in somewhat enfeebled health in 1872, Drew was for some time unemployed, and he devoted his leisure to the preparation of the book on Jammu and Kashmir, upon which his reputation for the future must mainly depend. In 1875 he accepted a mastership at Eton, and remained in the college until his death. The duties of his post required constant attendance, and for the

last few years he has been but rarely able to attend any of the London scientific societies. He was, however, too widely known, and too generally esteemed by his old friends of the School of Mines, the Geological Survey of Great Britain, and the Royal Geographical Society, as well as by those who knew him in Kashmir, to be forgotten, and it is a matter for deep regret that his untimely death has prevented his taking the position amongst scientific men in London for which his talents, his knowledge, his tact, and pleasing manners pre-eminently qualified him.

REPORT OF THE EVENING MEETINGS, SESSION 1891-2.

Third Meeting, 7th December, 1891.—The Right Hon. Sir M. E. GRANT DUFF, *O.C.S.I.*, President, in the Chair.

PRESENTATIONS.—*J. Archibald Douglas, Esq.*; *Rev. J. Barnes Breasley*; *William Henry Taggart, Esq.*

ELECTIONS.—*Gambier Bolton, Esq.*; *Thomas H. Conway, Esq.*; *Hon. Claude G. Hay*; *Patrick Joseph Hughes, Esq.*; *Rev. W. Morris*; *George Philip, Esq.*; *Antwerp Edgar Pratt, Esq.*; *J. Thorburn, Esq.*; *Sir Donald Mackenzie Wallace, A.C.I.E.*

The paper of the evening was:—

"Passes of the Taurus and Anti-Taurus." By D. G. Hogarth, *Esq.*, *M.A.*

MR. HOGARTH limited himself to an oral précis of a voluminous paper which he has prepared for the 'Supplementary Papers' of the Society, in which he describes the general characteristics, geographical and ethnographical, of the eastern half of the mountain system of Southern Asia Minor, the paper being based on experience gained in the course of his journeys in 1887, 1890, and 1891, undertaken under the auspices of the Asia Minor Exploration Fund, to which the Royal Geographical Society has been a generous contributor. In 1890, Prof. W. M. Ramsay was the head of the expedition, and though in the other years Mr. Hogarth was not accompanied by him, he followed lines which that great authority on Asia Minor had laid down. Mr. H. A. Brown (author of 'A Winter in Albania'), the Rev. A. C. Headlam, of All Souls' College, and Mr. J. A. H. Munro, of Lincoln College, Oxford, took part in the expedition in different years. The first object of the journeys was archaeological, to carry on the brilliant work of Professor Ramsay, commenced in 1881, but the members of the expeditions have always taken geographical notes and observations in traversing the interior of Asia Minor, about many parts of which less is known in modern than was known in ancient times. In following old trade-routes across and across the mountains, the explorers have traced the modern tracks, for the limits of ancient and modern geography are very often not to be distinguished in Asia Minor. Much of the peninsula is a land of the dead, but much also possesses great interest in the present, and, may be, will acquire an interest of a different kind for England in the near future. It has been explored by many travellers, from Pococke, Hamilton, and Leake, to the archaeologists who have penetrated it in different directions during the past twenty years, and the trained surveyors, led by Sir Charles Wilson, who did so much geographical work in it ten years ago. But Asia Minor is very large, often very difficult to traverse, and of very varied character, as is to be expected in the meeting-places of so many civilisations and faiths, ancient and modern. Much has yet to be done before western geographers can claim even a superficial knowledge of its whole area, and many parts have never been visited by any explorer at all.

The first district described was the wild mountainous region between the beautiful lakes of Egridir and Beysheher, remarkable for the absence of passes, for the great gorge of the Eurymedon, and for the primitive character of the indigenous population, who live cut off from the world. Not less noteworthy are the extraordinary ruins of the Pisidian city of Adada, which exist high up among the hill-tops, and are now called Kara-Barlo, a name which recalls Paul, and probably was derived from a great church dedicated to the apostle in commemoration of a sojourn on his way from Perga to Antioch in 45 A.D. These ruins preserve the most perfect specimen of an Anatolian city of Roman days. Passing by the sites of Lystra and Derbe, the Low Taurus is reached, a marked depression between the high inter-lacustrine ranges and the Bulgar Dagh, which begins about 70 miles west of the Cilician Gates (Gulek Bozboz). The waterless, arid character of the northern, and the beautiful scenery of the southern slopes, especially in the Calycadnus valley, were described in connection with the routes radiating from Katman. The remarkable ruins of the monastery of Koca Kalesi, which contain a very perfect church of the early fifth century at the latest, and of the city of Comissos, add archaeological interest to this section of the Taurus. The eastern part of this region is a veritable Pompeii, where Roman cities, villages, and roads have been left to decay in a deserted country.

The High Taurus is reached near Eregli. The famous defile known as the Cilician Gates has often been described, but not so the important passes farther east, from Sis to Hadjin and Gyukun; from Marash to Gyukun, Zeitun, and Alhistan; and from Adhaman to Pulet and Malatia. The eastern Taurus is a region of great beauty, richly wooded, and traversed by the tremendous cañons of the Samanti, the Saros, and the Jihan, not passable even on foot. Whenever a railway is made from Asia Minor towards the Euphrates, it will take the gorge of the latter river, which in ancient times was rendered possible for a road. The ethnographical and historical interest of this region is very great, as it formed the refuge of the last independent Armenians of Cilicia, whose robber-towns, Hadjin and Zeitun, were described by the author. Of late their exclusive possession has been disputed by Circassians and Kurds, the latter retaining curious traces of their pre-Islamite rites and customs.

Lastly, the principal passes into the Anti-Taurus from the west, and outspit on the east in the direction of the Euphrates, were briefly noticed. The Anti-Taurus district is one of the most curious in Asia Minor; man deserted it almost entirely from the 11th century until hardly fifty years ago, when the nomadic Avshar and Kurds penetrated to its remote and lofty valleys. Thus has been preserved so much of the great Roman military road to the Euphrates in the valleys of the Saros and Gyukun, with a series of milestones recording its many restorations; to the same cause we owe the interesting ruins of Comana, and "Hittite" monuments, recalling very early days, when a great trade-route, afterwards identical with the Royal Persian road, already took this line. Of different but equal interest are the modern inhabitants, nomadic Avshar and half-troglodyte Kurds, nominally Mussulmans, but really worshippers of other gods than that of Islam; and newly imported Circassians, settled near troublesome Armenian strongholds as a menace and a check. The medley of races in this remote region, for whose control the Turks seem able to make no adequate provision, suggests interesting speculations as to the possible future of race-supremacy in the Ottoman Empire.

Mr. Hogarth illustrated his lecture by a large number of lantern slides, prepared from photographs taken by himself, of which the following is a list, with descriptive remarks made upon each by the lecturer.

1. Egridir. The mountains are the charm of the picture. In the background

is the spit on which the town stands. Its most interesting feature is the castle, the sole relic of the 14th century principality, one of those which succeeded the breaking up of the Seljuk empire at Iconium. The large island is the residence of a small Greek colony, containing about fifty houses, all wretchedly poor; these are the same Greeks who in the 12th century preferred Mahommedan rulers to those of their own faith, the Byzantine emperors. We made the journey to the island in the wretched tubs the natives use for navigating the waters of the lake, and visited the monastery, where we found two Greek priests who had fallen as low as it is possible for Greeks to do under alien domination. The church smelt of damp and decay. The only treasure was a MSS. of the 14th century, of no particular value. The general tone of the inhabitants was that of those who had been better off long ago, but they were hardly aware that they had countrymen better off in any other country at the present day.

2. Low ground at the bottom of the lake. If the view had been more distinct the little town of Egerdir would be seen over the trees. A flat at the end of the lake is more variously wooded and richer than any other part of Asia Minor that I have seen. The mountain behind is Mount Vmros.

3. Derbe (Gudelmian). This desolate stone-strown mound is all that is left of Derbe. We may claim to be its first identifiers, as the American, Sterrett, who was here before us, failed to associate this particular place with the site. The buildings upon it are in the main modern; the building on the left is the most ancient but not pre-Turkish; the mound itself no doubt conceals many relics of the ancient city.

4. Karaman (general view). A low tract in the foreground is characteristic of this section of the plain; the castle in the centre may probably be of Byzantine origin, the ruins are mostly Turkish.

5. Karaman Castle. We have here the foundations of the Byzantine wall, but most of it goes back only to that time when the Emirs of Karaman succeeded the Seljuk Sultans.

6. This last demands explanation and apology, as it is not in Karaman at all, but it is one of the finest representatives of Seljuk work, of which Karaman contains some fine examples. This is the Gyuk Medress at Siwas, built by the Sultan Karkhoru who employed a Greek architect from Iconium. This is the first evidence we have of the employment of Greek architects by the Seljuks.

7. City of Coropisces. These are the ruins Mr. Davis saw fifteen years ago, probably erected in Byzantine times, afterwards becoming a great Armenian fortress; Barbarossa passed by here on that march to the sea in which he lost his life; the tombs in the foreground are fairly ancient, also the great church in the middle; the citadel is away on the left at the other extremity; most of the buildings were probably erected in the 9th and 10th centuries of our era.

8. The church of Coropisces, taken from the east end. It seems to be of the 7th or 8th century A.D., but it is difficult to attach a very certain date to it; the whole place is absolutely deserted; in summer there is an encampment three miles away, but for most of the months there is not a human inhabitant for 15 or 20 miles.

9. Koja Kalessi (general view). The great monastery is almost upon the summit of the northern wall of the Calycadnos; the view shows the church from the east end, and the monastery buildings extend west. The church was restored by Justinian, and therefore was founded earlier than his time. The mountain on the horizon is the natural wall on the other side of the Calycadnos valley.

10. The gate of the monastery, entered from the west. The gate is remarkable, as indeed the church is also, for showing practically no Christian symbolism at all, with the exception perhaps of the winged figures, which might indeed be heathen, as they are quite as much like the winged figures of the older faith as Christian symbols.

11. The smallest of the three west doors of the church. Here again the ornamentation shows no signs of Christian symbolism whatever; it seems, when this church was built, heathen tradition was too strong for Christian symbolism to have any chance against it.

12. The interior of the church, which, as you see, is almost perfect; there are many remarkable things about this, and we are going to publish a fairly complete account of it soon, with the help of Messrs. Schultz and Barnsley, who are among the best authorities on the subject. The church goes back to the 5th and perhaps as far as the 4th century; this opinion is based to a great extent upon the character of the columns, capitals, triforium, and general style of the masonry. One date can be fixed, that is a date on a tomb in the precincts; it is 461 A.D. A monk of the church had carved an inscription for his own tomb, putting in the date of his birth, but leaving the date of his death blank for others to fill in, but this they did not do. It is not presumptuous for us to conjecture that this church may go back as far as the 4th century, at the time of the first official recognition of Christianity in the Roman empire, and if so, it is certainly the earliest church in anything like good preservation in the eastern half of the Christian world.

13. Byzantine bridge over the Calycadnos. It is interesting, if for nothing else, because it shows a curious architectural fault, holes having been made in the pier just where it should have been strongest, consequently it has given way there; the Calycadnos is 50 yards broad here, and it was almost deep enough in summer to prevent us fording it.

14. A little temple on the right bank of the river Calycadnos, at Jelle, typical of the kind of ruin to be seen in this part of Asia Minor; it is of the time of Hadrian. We were misled by the natives into going to see this ruin instead of that of Dacryssus.

15. A tower, which gives its name to the modern representative of Olba, Uzunja-burj, probably built in the 2nd century, of very massive masonry; it is over 60 feet high and dominates the whole town.

16. Triple arch of the *agora*, which shows how complete the ruins are. Through this triple gate various temples were approached. The temple of Tyche appears through the centre arch.

17. Colonnade leading up to the temple of Zeus Olbius, which Pompey left to the rule of its native priests. A curious architectural feature here is the letting in of pedestals in a separate drum in the columns.

18. The temple of Zeus Olbius, which was turned into a church early in the Christian era and altered almost out of recognition. The columns still stand, and are, as you see, all of the Roman period, being only fluted part of the way down.

19. The same temple from the east end, with masses of *debris* and brushwood intervening, thus preventing a good view.

20. Tower of Masdan. One of the pirate towers of Cilicia, situated on the lower slopes of the Taurus. Built in the 1st or 2nd centuries before Christ, when the Cilicians were lords of the Mediterranean. Nothing is known of the particular forts as there are no inscriptions. Mr. Bent has described them fully.

21. Adana. Shows the way in which the population lives on the roofs in the summer. The frames are the beds fixed on the roofs, over which are spread the mosquito curtains. Impossible to get a characteristic view of the whole city owing to the absence of high ground. This was taken from the roof of a house, and represents a small part of the Christian quarter.

22. Entrance to the pass of Sis. The houses in the foreground are a part only of the place, most of it being below the hill.

23. Marash, with Mount Amanus in the background, taken just before sunset; gives an idea of the great plain of Northern Syria, looking towards the range dividing Syria from Cilicia.

24. The gorge of the Jihon Pass between Marash and Albistan: the view is taken from 900 feet above the level of the water. Looking south we get an idea of the difficulty of the road, which is like a white ribbon winding upon the left of the picture. The mountain in the background is the last range of the Taurus.

25. Arslan Tash. Lion of archaic and peculiarly rude construction, which still stands about 15 to 16 miles north of Albistan--was seen by Von Moltke when travelling in Turkey.

26. Another lion with a typical Armenian near it: it is built into the house, and nothing can be seen but the head and deep-cut eyes.

27. Palanga. Statue of archaic construction, known as a statue only by the line of drapery. It has a Hittite inscription in the incised character. Is probably the latest monument of its kind yet discovered in the world.

28. Albistan. Obelisk belonging to the Government, which we were allowed to photograph on condition we took the group of gentlemen standing round it. We took several photos of this, but in the others, as we only focussed the obelisk, the gentlemen have not come out so well. The history of its coming into the hands of the Government is as follows:—A German heard of it and endeavoured to buy it from the natives; the Government got wind of this and the natives who had refused to sell it for 17½ had to give it up to the Government for nothing. It is a very interesting monument in Hittite character, inscribed on all four sides with sixty-seven lines of writing.

29. General view of the ruins of Comana in Cappadocia. In the foreground the massive ruins are probably those of a temple; there are also those of a theatre, and the remains of a bath. They are very well preserved on account of being but lately inhabited.

30. Comana. Theatre from a nearer point of view; a part of it is hidden by a landslip from the hill above.

31. A gate at Comana, which stands upon the hill above, and belongs to a more recent period. This is characteristic of many of the remains in this part of Asia Minor.

32. Valley of Gyksun. A Turkish cemetery in the foreground, and in the centre a part of the Taurus; the road goes away to the left. Several old mile-stones are made use of in this cemetery as tombstones.

33. Cemetery of Kanlukavak, looking towards Taurus. There are 20 to 25 mile-stones in this cemetery used as tombstones. It is curious to think that Turkish villagers rest in this cemetery with the names and titles of Roman Emperors at their heads.

On the conclusion of the lecture,

The PRESIDENT said: I can only say that I am sure you have been extremely gratified by the address to which you have listened. We very much regret that Professor Ramsay is not with us, and still more regret the cause of his absence, ill-health, but you will all agree that he has had a most admirable substitute in Mr. Hogarth. What he has told us connects in an interesting manner with a very good paper which Mr. Bent, whom we hope soon to see again amongst us, read not very long ago, but in the latter part of his paper regarding the Anti-Taurus, he took us into a region in regard to which I think none of us knew anything. The paper was throughout most valuable, and I daresay some of the parts which appealed to most of those whom I address were those where Mr. Hogarth's journeys crossed the

journeys of St. Paul. You will, I am sure, direct me to give him your most hearty thanks, and to convey to Professor Ramsay our regrets that he was not able to be present on this occasion.

Mr. HOGARTH returned thanks for the way in which his paper had been received, and said that he wished Professor Ramsay could have been there, as he could speak with far greater authority, as he had been there every year for many years past, and when next a paper is read on this subject he hoped that Professor Ramsay would either be the author or reader. He hoped that the Society and general public will extend to the Asiatic Exploration Fund in the future that sympathy it had shown in the past.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELLIE, *Librarian R.G.S.*)

EUROPE.

Bonaparte, [Prince] Roland.—Une Excursion en Corse. Paris, 1891: 4to, 11 xi. and 273. [Presented by the Author.]

Describes the author's visit to Corsica. About one-half of the volume consists of an apparently extensive bibliography of Corsica, which in itself is a useful feature, as also are the illustrations with which the text is embellished.

Gulbenkian, Calouste S.—La Transcaucasie et la Péninsule d'Apchéron, Souvenirs de Voyage. Paris, Hachette & Co., 1891: 12mo, pp. xxxi. and 336. [Presented by the Author.]

A pleasantly written account of a visit to the Caucasus and to the Trans-Caucasian oil regions. The author gives some good descriptions of the places passed through, including Batoum, Koutais, Tiflis, Baku, and other places in the Apcheron Peninsula. Especially interesting are the chapters dealing with petroleum and the petroleum industry, and the chapter on the manufacture of Oriental carpets. There are two maps—one of the Caucasus, the other of the Apcheron Peninsula.

Jervis, Guglielmo.—I Tesori Sotterranei dell'Italia. Repertorio d'informazioni utili. Parte quarta. Geologia economica dell'Italia. Torino, E. Loescher, 1889: 8vo, pp. xxxvi. and 516, illustrations. [Presented by the Author.]

Melena, Elpis.—Erebnisse und Beobachtungen eines mehr als 20-jährigen Aufenthaltes auf Kreta. Hannover, 1892: 4to, pp. viii. and 296, map and plates. Price 12s.

[Murray's Handbooks.]—Handbook for Travellers in Northern Italy. Sixteenth edition. London, John Murray, 1891: post 8vo, pp. [62] and 541, map and plans. Price 10s.

[—] A Handbook for Travellers in Switzerland. [In two parts.] Part I. Switzerland without the Pennine Alps. Part II. The Alps of Savoy and Piedmont, the Italian Lakes, and part of the Dauphiné. Eighteenth edition. London, John Murray, 1891: post 8vo, pp. viii. and 700, maps and plans. Price 10s.

The present edition of the Handbook for Switzerland has been very carefully revised by Mr. W. A. B. Coehdige, who has evidently spared no pains to make the guide-book as complete and reliable as possible. Additional information as to the present political, social, and economical condition of Switzerland has been incorporated in the introductory chapter, and the list of books recommended largely increased. The information as regards the mountain districts has been brought up to date, and several valleys and villages, as yet little

known to English travellers, are fully described, largely from personal knowledge. The maps have been revised, and one new district map (Davos) added.

[**Scotland.**—*Early Travellers in Scotland.* Edited by P. Hume Brown. Edinburgh, D. Douglas, 1891: 8vo, pp. xxvii. and 300. Price 14s.

The present volume contains a collection, as complete as possible, of all the accounts of Scotland published by travellers who visited the country before 1700. The primary object of this collection is to throw light on certain aspects of Scotland and its people, which cannot be presented in ordinary histories, and to these the volume will serve as a useful supplement. The travellers treated of are—Edward I. (1295); Jean Froissart (reign of David II.); John Hardyng (reign of James I.); Eneas Sylvius (reign of James I.); Jacques de Lalain (1448); Pedro de Ayala (1498); Andrea Trevisano (1498); Peder Swave (1535); Nicander Nucius (1545); Jean de Beaugué (1548); Estienne Perlin (1551); Fynes Moryson (1598); Henri, Duc de Rohan (1600); Sir Anthony Weldon (?) (1617); Taylor the Water-Poet (1618); Sir William Baretton (1636); James Howell (1639); Thomas Tucker (1655); Richard Franck (1656); Jorevin de Rocheford (1661?); John Ray (1662); James Browne (1669); Thomas Kirke (1679); Thomas Morer (1689). The maps illustrating the volume are—Map of Scotland of the 13th century, with key; Map of Scotland, by Matthew Paris, with key; Map of Scotland from Mercator's Atlas, 1595.

ASIA.

Cochard, Léon.—Paris, Boukara-Samarcaude. *Notes de Voyage.* Paris, Hachette & Co., 1891: 8vo, pp. ix. and 146, maps and illustrations.

[**Murray's Handbooks.**—*A Handbook for Travellers in India and Ceylon*, including the Provinces of Bengal, Bombay, and Madras (the Panjab, North-west Provinces, Rajputana, Central Provinces, Mysore, &c.), the Native States and Assam. London, John Murray, 1891: post 8vo, pp. lix. and 440. Price 15s.

The original edition of the handbook for India was issued in four volumes, but it has now been found necessary to rearrange the guide in an entirely new form. It has, it is stated, to a great extent been rewritten, thoroughly revised, and condensed into one handy volume. Many new maps and plans of towns, countries, and buildings, have been added to the present edition, which is moreover furnished with an index and directory, containing information relating to hotels, dak bungalows, clubs, steamers, names and addresses of banks, tradespeople, &c. The account of Ceylon is almost wholly written by the Hon. Sir Arthur Gordon, G.C.M.G.

Risley, H. H.—*The Tribes and Castes of Bengal.* Two vols. Calcutta, 1891: large 8vo, pp. xxxviii. and 875. [Presented by the Secretary of State for India.]

These two volumes consist of a collection of tables of anthropometric measurements. A full analysis of the measurements, it is stated, indicating their bearing upon the ethnology of Northern India, and also upon certain more general questions which have been discussed by ethnologists in Europe, will be given in a separate volume.

Rockhill, W. Woodville.—*The Land of the Lamas. Notes of a Journey through China, Mongolia, and Tibet.* London, Longmans & Co., 1891: 8vo, pp. 399, maps and illustrations. Price 15s. [Presented by the Author.]

While other parts of Inner Asia are rapidly being opened out and explored, Tibet is to this day a land of wonders and romance. Guarded against foreign intrusion by the jealousy of its militant priesthood, no less than by the formidable barriers placed there by nature, Tibet holds the European traveller and explorer, however adventurous and enthusiastic, at arm's length. Prejevalsky, Carey, Szzechényi, Bonvalot and Prince Henry of Orleans have tried and failed to reach Lhasa. What Europeans could not accomplish an American has now attempted with no better success. His book, like theirs, is the history of a

failure. Fortunately, in common with his predecessors, Mr. Rockhill was gifted with excellent powers of observation, and he used these to good purpose in collecting materials for the very readable and interesting book he has produced. His preparations included a residence of four years at Peking, where he acquired the Tibetan language and learnt many particulars of the inhabitants. Dispensing with impedimenta that most travellers consider necessary, Mr. Rockhill left Peking with only one servant, all his baggage being stowed away in two carts, on his "five weeks jog through China."

The journey through the provinces of Chih-li, Shan-hsi, and Shen-hsi, described in the first chapter, lay over ground already familiar to us. It was only on entering Western Kan-su, the borderland of China proper, that he trod on a less known, and therefore a more interesting field. The chapter on Lan-chou-fu, Hsi-ning, Kumbum, and Tankar, contains much that will be new even to those acquainted with the best standard works; thus particulars are given of the tobacco trade, the Muhammadans, the Sun-ch'uan Mongols, Abbé Hue's servant Santan Chemda, who is still alive and hearty, the *ada*, an obligatory service of horses and supplies for officials, the lamaseries and temples, butter-las-reliefs, the nomadic tribes of Koko-nor, their tents and habits of life. These, and a number of other things which struck him as curious, are recorded in chapter ii.

At Tankar (Tonkir) final arrangements were made for the journey westward, including the engagement of a trustworthy servant. Passing to the north of Koko-nor, the "blue" or "azure lake" with its "Dragon Colt's Island," and then to the west, he crossed the river Buha-gol, known to us as the Pouban-gol of Hue. Mr. Rockhill found this stream not more than 40 feet wide and two feet deep, so that Hue, whose account of it was written from memory, may have embellished, though it is probable that the river was much larger forty-five years ago, and that in October, when the worthy Abbé crossed, it may have contained much more water. Prejevalsky, it will be remembered, cites this as an instance of Hue's want of veracity, he having found the river about 100 feet wide and fordable everywhere. Crossing the South Koko-nor range our traveller proceeded to Dulan-kuo (Dulan-kit), the capital of the Mongol Prince or Wang of Koko-nor. Here he met a party of lamas who talked about the war between the people of Lh'asa and the British, and said that Tibet was in a state of great excitement.

The Koko-nor Mongols, described by Hue and Prejevalsky in unfavourable terms, produced on Mr. Rockhill quite a different impression; he found them obliging, hospitable, and decidedly honest. It should, however, be noticed here that the Russian traveller, in the picture he drew of them, did not include others of their race, whom he generally much preferred to any other Asiatics with whom he came in contact. At Dulan-kuo our author met a Chinese official who was going to collect the tax for the Imperial Government in Eastern Tibet. In his company Mr. Rockhill travelled for a fortnight, gaining his good will, and afterwards receiving from him important services. From Baron Tsaidam an excursion to the sources of the Baian-gol led to the discovery of a peak or *massif* 17,000 to 18,000 feet high, named by our traveller Mount Caroline. Here he learnt that there were insuperable difficulties in his going to Lh'asa, and he therefore decided on crossing Eastern Tibet. When the caravan finally organised left Baron Tsaidam, it numbered two Mongols, four Chinese, seventeen ponies, and two Tibetan mastiffs. The route now led to the sources of the Yellow River, where, on the elevated plain of Karunat'ang, the Qlontala or "starry lake" of the Mongols (14,000 feet), the effects of the rarefied atmosphere were painfully felt. South of this the country and climate changed considerably—the hills became more imposing and several ranges came in view, and on approaching the Dré-ch'u (Di-chu of Prejevalsky) storms became more frequent. It is worth mentioning that Mr. Rockhill completely confirms what Prejevalsky says of the extraordinary abundance of wild animals on these lofty plains. Our author speaks of "hills literally black with yak," large herds of antelopes and wild asses; of these latter, however, he saw no more after leaving the Yellow River. The watershed between this river and the Yang-tzu was crossed on May 18th, and their supply of food being at an end, the party were obliged to

seek assistance of a native chief, who fortunately came to the rescue and provided yaks and ponies to enable Mr. Rockhill to reach Jyekundo.

The crossing of the Dré ch'u, the upper Yang-tze-kiang, and the continuation of the journey through the thickly peopled region extending without interruption to Ta-chien-lu, are described in chapter v. Shortly before reaching this river a rencontre with a large party of horsemen, armed to the teeth, nearly defeated Mr. Rockhill's plans. Stratagem was resorted to, and while the unsuspecting Tibetans rode forward, our traveller and his companions, left to follow behind, turned off the road, and after a few miles' ride over very rocky and difficult ground, reached the ferry. They were safely taken across in a frail craft made of yak hide, no larger than a washtub and not unlike it in shape, while their animals swam the stream, which is here 150 yards wide and has a very strong current. The highest point of the journey was the pass over the Taglung-la, 16,450 feet; a second pass, the Ngi-ch'en-la, not much lower, had to be crossed the following day, and then the valley of Jyekundo was reached. Our knowledge of this region is mainly derived from the pundit Kishen Singh's report. With regard to his survey our author generally found it wonderfully accurate, but the names on his map are in most cases so badly transcribed that they were absolutely unrecognizable by the people of the country. Mr. Rockhill travelled with prismatic compass, hypsometer, and aneroid, and his survey on a quarter-inch scale has been reduced on the route map accompanying the volume. Unfortunately this map is on so small a scale and is so badly executed as to be of little or no value. There are some good illustrations, and valuable notes, appendices and tables are added.—(E. D. M.)

Telfer, (Capt.) J. B.—*Armenia and its People.* Journal of the Society of Arts, vol. xxxix., No. 2010, May 29, 1891. London, G. Bell & Sons, 1891: large 8vo.

AFRICA.

Ellis, A. B.—*The Tshi-speaking Peoples of the Gold Coast of West Africa.* London, Chapman and Hall, 1887: 8vo, pp. vii. and 343, map. Price 10s. 6d.

In this volume Major Ellis has brought together a mass of information relating to the group of people dealt with. This, and the volume on the Ewe-speaking peoples (Proc. R.G.S., 1891, p. 54) are only two out of four which the author has in mind; the other two volumes will treat of the Ga-speaking peoples of the Gold Coast, and the Yoruba-speaking peoples of the Slave Coast. The author's original object in producing these books was to show by examples taken from certain negro peoples of the West Coast of Africa, how the evolution of religion may proceed. In collecting information concerning the religion of these peoples, Major Ellis has incidentally gathered much useful matter of ethnological interest respecting their laws, government, customs, traditions, and folklore, &c., which he has incorporated in the present volumes; not, as he states, with the intention of putting them forward as complete records of their social and mental condition, but in order to make a starting-point from which a systematic and more complete study of these hitherto neglected peoples may be made.

Junker, (Dr.) Wilhelm.—*Travels in Africa during the years 1870-1883.* Translated from the German by A. H. Keane, F.R.G.S. London, Chapman & Hall, 1891: 8vo, pp. viii. and 477, map and illustrations. Price 21s. [Presented by the Publishers.]

The original German edition of vol. ii. of Dr. Junker's work, of which the present volume is a translation, was noticed at some length in the "Proceedings" for July 1891, at p. 442. In the English edition all the six engraved and admirable maps are omitted, and the text has been condensed by about sixty pages.

[Murray's Handbooks.]—*A Handbook for Travellers in Lower and Upper Egypt;* including descriptions of the course of the Nile through Egypt and Nubia, Alexandria, Cairo, the Pyramids, Thebes, the First and Second Cataracts, the Suez Canal

the Peninsula of Mount Sinai, the Oases, the Fayûm, &c. Eighth edition. London, John Murray, 1891: post 8vo, pp. [15] and 368, maps and plans. Price 15s.

In this edition appears for the first time a more complete description of the new Museum at Gizeh and its contents than has yet been published.

Rougé, [Vte.] Jacques de.—*Géographie Ancienne de la Basse-Égypte*. Paris, J. Rothschild, 1891: 8vo, pp. xii. and 176, map. Price 15s.

This is an attempt to identify, from the hieroglyphics, the ancient divisions of Egypt with the existing divisions.

Schleicher, A. W.—*Afrikanische Petrefakten*. Ein Versuch der grammatischen Bildungen und Formwurzeln der Afrikanischen Sprachen durch Sprachvergleichung. Berlin, T. Frohlich, 1891: 8vo, pp. v. and 93. [Presented by the Publisher.]

Wissmann, Hermann von.—*My Second Journey through Equatorial Africa, from the Congo to the Zambesi, in the years 1886 and 1887*. Translated from the German by Minna J. A. Bergmann. London, Chatto & Windus, 1891: 8vo, pp. xiv. and 326, map and illustrations. Price 16s. [Presented by the Publishers.]

The original German edition of this work was noticed in the 'Proceedings' for August 1891, at p. 508.

AMERICA.

Bolivia.—*Documentos Históricos de Bolivia*. Historia de la Misión de Los Mejos por el Padre Diego P. Altamirano, de la Compañía de Jesús, publicada por Manuel Ballivian. La Paz, 1891. [Presented by Señor Ballivian.]

The exploration of the rich valleys to the eastward of Upper Peru (the present Republic of Bolivia) was largely due to the religious zeal of Jesuit missionaries. Señor Ballivian is doing useful geographical work in printing some of the records of this work, which have hitherto remained in manuscript, in the National Library at Lima. Altamirano flourished during the last half of the 17th century, and the present publication is only a chapter from his history of the work of the Jesuits in Peru. The *Mejos* missions were commenced in 1586, and from that time until the suppression of the order, the Jesuits continued their work, some results of which were the mapping of an extensive region previously unknown, numerous narratives of travel, collections of words and grammar of Indian languages, and descriptions of the numerous tribes of *Mejos* and *Chiquitos*. The "*Historia de la Misión de los Mejos*" consists of a general account of this work, and the volume includes a life of Altamirano by Don Enrique T. Saldamando, the author of biographical notices of the Jesuits of Peru.

Howland, O. A.—*The New Empire. Reflections upon its Origin and Constitution, and its relation to the Great Republic*. London, E. Arnold; Toronto, Hart & Co., 1891: 8vo, pp. xix. and 608. Price 12s. 6d. [Presented by the Publisher.]

This volume deals with Canada mainly from the historical point of view. In the first chapter the author treats of the fall of the old empire in 1783, and in succeeding chapters discusses such matters as—the Treaty of Partition and its fulfilment, the Constitution of the New Empire, the Canadian Centenary Year, and the Crisis of the Empire. A map is given of North America, showing the boundaries of the United States, Canada, and the Spanish possessions according to the proposals of the Court of France, 1782, besides a facsimile of the original Proclamation of 1763.

Pilot, [Rev.] W.—*Geography of Newfoundland for the use of Schools*. London and Glasgow, W. Collins, Sons, & Co.: 12mo, pp. 40, illustrations. [Presented by the Author.]

Seton-Karr, H. W.—Bear-hunting in the White Mountains, or, Alaska and British Columbia revisited. London, Chapman & Hall, 1891: 8vo, pp. vi. and 156, map and illustrations. Price 4s. 6d. [Presented by the Publishers.]

An account of hunting experiences in the little-known Chilcat region of Alaska and British Columbia.

GENERAL.

Arnold, (Sir) Edwin.—Seas and Lands. 2nd edition. London, Longmans & Co., 1891: 8vo, pp. x. and 535. Price 21s. [Presented by the Publishers.]

In this volume Sir Edwin Arnold has reprinted his entertaining letters which appeared in the *Daily Telegraph* under the title of "By Sea and Land," descriptive of his tour round the world. The places visited in Canada and the States on the outward journey have frequently been described before, so that the opening chapters may be lightly passed over. The volume largely deals with Japan, and we may say contains as good an account of the country and the people as has appeared in recent years. Here Sir Edwin resided for twelve months, and during this time evidently saw much of the country and people, exceptional opportunities having been afforded him of becoming personally acquainted with their every-day life, many minute details concerning which being noted. The homeward journey was made by way of Hong Kong, Singapore, and Colombo. The illustrations throughout the volume are excellent.

NEW MAPS.

(By J. COLLS, *Map Curator n.d.s.*)

WORLD.

Ebstorfer Weltkarte.—Die —, im Auftrage des Historischen Vereins für Niedersachsen mit Unterstützung des Königl. Preussischen Ministeriums der geistlichen, Unterrichts- und Medizinal- Angelegenheiten und der Wedekind'schen Preussifung zu Göttingen, herausgegeben von Ernst Sommerbrodt. Hannover, Hahn'sche Buchhandlung, 1891. Price 17. 12s. (*Williams & Norgate.*)

This is a reproduction of a very fine specimen of the cartography of the middle ages, which was discovered in the Benedictine Convent of Ebstorf in 1830. In 1833 Aitmann Wömpner called attention to its existence, and on the occasion of the jubilee of the Historical Society of Hanover, 1885, Dr. Sommerbrodt made special reference to it in a paper entitled "Afrika auf der Ebstorfer Weltkarte." Two years later the Historical Society of Göttingen made a grant of 3000 marks to defray the expenses of its reproduction. This was undertaken by Professor Rösse and Dr. Sommerbrodt, who have carried out the work in a most satisfactory manner. The original is drawn on 30 sheets of parchment of various sizes, which together form a map of about 12 feet square. Each of these sheets is highly coloured, and copious notes are given on the margin, on the creation of the world, the heavens, the earth, and a complete description of the map itself. When Professor Rösse and Dr. Sommerbrodt undertook this work, many of the details of the map were nearly obliterated, and where this was the case, it had to be carefully restored in order to facilitate reproduction. The map bears no date, and in order to arrive at the time when it was compiled, the joint editors have had to search through all the early maps which could possibly have been used in its compilation. This has been done, a list of all the maps consulted has been given, and the conclusion arrived at is that the Ebstorf map was compiled in the second half of the 13th century.

The work of reproduction has been admirably carried out, and the map is accompanied by explanatory letterpress in which every detail in connection with it is dealt with in the most able and painstaking manner.

EUROPE.

Balkan-Halbinsel.—Josef v. Scheda's General-Karte der —, 13 Blätter, scale 1:864,000 or 11·8 geographical miles to an inch. Umarbeitung von A. Steinhäuser. Nach neuesten Materialien berichtigt, mit Höhenzahlen-, Strassen- und Eisenbahn-Nachträgen versehen. Neueste politische Eintheilung. 1891. Verlag von Artaria & Co., Wien. Price 14s. [Presented by the Publishers.]

This is a new edition of Scheda's well-known map of the Balkan Peninsula. In the present instance the heights have been corrected from recent data, the roads and railways have been carefully brought up to date, and the political boundaries are shown according to the most reliable information. In addition to the 12 sheets composing the general map, there is a plan of Constantinople on the scale of 1:28,800.

Deutschen Reiches.—Karte des —, scale 1:100,000 or 1·3 geographical miles to an inch. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme 1891. Sheets 252, Exin; 253, Inowrazlaw; 398, Woldau; 546, Tauberbischofsheim. Price 1s. 6d. each sheet. (*Dulau*.)

Huddersfield and District.—Contour Map of —. Drawn by Fred D. King, Bradford. Scale 1:37,270 or 1·95 inches to a geographical mile. Printed and published by E. J. Arnold, Leeds. [Presented by the Author.]

For educational purposes the system of shading adopted by Mr. King leaves very little to be desired. The shades of brown are well chosen, being sufficiently expressed to be easily distinguished from one another, and at the same time so gradual as to give a very correct idea of the topography when viewed from a distance. The towns are represented by circles of a magnitude proportioned to the number of inhabitants they contain, railways are laid down in red, whilst roads, rivers, and canals are also clearly shown.

Roma.—Edizione Tascabile della grande Pianta di —, pubblicata dall' Istituto Cartografico Italiano per cura del Comune di Roma. Scale 1:12,000 or 6·1 inches to a geographical mile. Istituto Cartografico Italiano, Roma, 1892. Price 2s. 6d. [Presented by the Istituto Cartografico Italiano, Rome.]

Sicilia.—Carta Generale della —, secondo i nuovi rilievi del R. Stato Maggiore con speciale indicazione dell' altimetria, delle reti stradali e delle circoscrizioni amministrative ed elettorali, disegnata da G. E. Fritzsche, pubblicata dall' Istituto Cartografico Italiano, Roma. Scale 1:500,000 or 6·8 geographical miles to an inch. [Presented by the Istituto Cartografico Italiano, Rome.]

On this map the electoral and administrative districts are shown, all means of communication by land and sea are laid down, and the number of hours occupied by steamers between the different ports is given. The altitudes above sea-level as far as 100 and 300 metres are indicated by two shades of green, more accurate detail being given by a system of contour lines, commencing at 50 metres above sea-level and ending at 1000; these, however, are drawn so faintly that very great difficulty is experienced in tracing them, and in some portions of the map it is quite impossible to do so. The adjacent islands which lie beyond the limits of the sheet on which the principal map is drawn, are given on insets.

Yorkshire.—Contour Map of —, Physical and Political. Designed and drawn by Fred D. King, Bradford. Scale 1:138,700 or 1·9 geographical miles to an inch. Published by E. J. Arnold, Leeds. [Presented by the Author.]

In this map the hills are shown by a combination of orographic colouring and shading, the sea and rivers as far as the tidal influence is felt are coloured blue, the importance of towns as regards population is shown by circles of different size, and all means of communication are laid down. It is drawn in a bold style, well suited for educational purposes.

No. 1.—JAN. 1892.]

ORDNANCE SURVEY MAPS.

Publications issued since the 14th November, 1891.

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ENGLAND AND WALES. New Series. Sheets Nos. 114, 114, 143, 145, 193, 261; and Nos. 277, 278 advanced edition, photozincographed.

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ENGLAND AND WALES. **Lancashire**, XVI. 14, 45.; XXI. 15, 55. **Yorkshire**, XCIII. 10, CV. 15, CVI. 10, 11, CVII. 1, CVIII. 1, 2, 3, 6, 11, CXVIII. 1, 2, 3, 11, 12, 15, CCXI. 1, 2, 5, CCXII. 15, CCXIII. 12, CCXIV. 1, CCXXV. 12, CCXXVI. 1, 45. each; 3, 34, 1. CCXXVII. 2, 65., CLII. 9, 11, 32.; 15, 45.

Town Plans—10-feet scale:—

ENGLAND AND WALES. **Bingley** (Yorkshire), CCI. 8, 1, 2, 6, 7, 8, 55. each; 11, 44., 12, 55. This town is now complete in 7 sheets (coloured). Index 2d. **Bolton** (Lancashire), LXXXVII. 5, 15, 24, 54. each; LXXXVII. 9, 2, 35., 1, 4, 7, 55. each; 13, 23, 24, 20, 114. 6d. each; LXXXVII. 13, 2, 55.; 3, 112. 6d.; 7, 45., 11, 12, 55. each; 14, 112. 6d.; 15, 55., 17, 55., 20, 55.; 21, 65., 23, 24, 55. each; LXXXVII. 14, 1, 55.; 3, 45., 9, 55. (coloured). **Bradford** (Yorkshire), CCXVI. 8, 9, 13, 14, 64. each; 15, 14, 55. each; 19, 23, 25, 55. each. This town is now complete in 26 sheets (coloured). **Great Harwood and Clayton-le-Moor** (Lancashire), LXIII. 2, 16, 17, 45. each; 21, 65.; 22, 74.; 23, LXIII. 6, 2, 1, 55. each; 6, 7, 45. each; 14, 55.; 15, 45.; 20, 25, LXIII. 10, 5, 55. each (coloured). **Harrogate** (Yorkshire), CLIV. 14, 3, 55. (coloured). This town is now complete in 24 sheets. Index 4d. **Kingston-upon-Hull** (Yorkshire), CCXXVI. 15, 1, 44.; 3, 4, 55. each; 15, 19, 45. each; CCXXVI. 2, 3, 55.; 5, 10, 112. 6d. each; 12, 72., 19, 112. 6d.; CCXXVI. 3, 4, 55.; 15, 19, 45. each; CCXXVI. 11, 24, 35. **Liverpool** (Lancashire), CVI. 9, 25, 45.; CVI. 10, 2, 74.; 4, 5, 7, 4, 9, 12, 13, 14, 17, 22, 23, 24, CVI. 11, 1, 2, 112. 6d. each; 3, 4, 55. each; 7, 55.; 8, 45.; 11, 16, 112. 6d.; 17, 55.; CVI. 14, 2, 112. 6d.; 3, 55.; 4, 5, 112. 6d.; CVI. 15, 3, 55. **Ripon** (Yorkshire), CLIX. 6, 10, 55. This town is now complete in 9 sheets (coloured). Index 2d. **Shipley and Saltire** (Yorkshire), CCI. 11, 7, 10, 55. each (coloured). **Skipton** (Yorkshire), CLXVIII. 5, 15, 45. (coloured). Index 2d. **York** (Yorkshire), CLXXIV. 10, 24, 55. (coloured). This town is now complete in 72 sheets. Index 6d.

(*Stanford, Agent.*)

ASIA.

Burma.—Map of —, constructed by W. & A. K. Johnston, Edinburgh and London. Scale 1:935,000 or 12·8 geographical miles to an inch. 2 sheets. Price 12s. [Presented by the Publishers.]

In the compilation of this map the publishers have taken advantage of the recent information collected by the officers of the Indian Survey Department. It is drawn in a style suitable for educational purposes, the political divisions being clearly shown, and the railways laid down.

AFRICA.

Äquatorial-Ost-Afrika.—Neue Spezialkarte von —, nach den neuesten Forschungen, bearbeitet von Richard Kiepert. Scale 1:3,000,000 or 41·6 geographical miles to an inch. Berlin, Dietrich Reimer (Hoeser & Volksen), Oktober 1891. Price 3s. (*Williams & Norgate.*)

This is the third edition of the map. It has been brought up to date, and shows very clearly the extent of the Spheres of Influence of the several European Powers. Accompanying the map is an index, by the use of which the work of finding the position of any place it contains, is much simplified.

Africa Meridional.—Carta das Possessões Portuguezas da —, segundo as convenções celebradas em 1891. Scale 1:6,000,000 or 82·2 geographical miles to an inch. Gravado e impresso por Erhard Fres., Paris. Ministerio da Marinha e Ultramar. Comissão de Cartographia, Lisbon. [Presented by the Comissão de Cartographia, Lisbon.]

Habenicht, H.—Sydow-Habenicht: Methodischer Wand-Atlas, No. 5. Africa. Oro-hydrographische Schul-Wandkarte nach J. E. v. Sydow's Plan, bearbeitet von H. Habenicht. Scale 1:6,000,000 or 82·2 geographical miles to an inch. Gotha, Justus Perthes, 1891. 9 sheets. Price 12s. 6d. (*Philip & Son.*)

This forms one of the Sydow-Habenicht's series of school wall-maps. It is drawn in a bold style suitable to the purpose for which it has been published, and is coloured orographically. Depressions below sea-level are shown in dark-

green, and the lowlands from sea-level to 200 metres in light green; land from 200 to 500 metres is white, highlands from 500 to 2000 metres light brown, and land over 2000 dark brown. The depths of the sea are indicated by contour lines. The limits of different classes of vegetation are shown. A clear explanation of the signs employed is given at the foot of the map.

Pungue.—Revus e parte do Buio. Esboço das Bacias Hydrographicas dos Rios —. Scale 1:500,000 or 6·8 geographical miles to an inch. Ministerio da Marinha e Ultramar. Comissão de Cartographia. Lisbon, 1891. [Presented by the Comissão de Cartographia, Lisbon.]

S. Thomé.—Carta da Ilha de —. Scale 1:150,000 or 2 geographical miles to an inch. Ministerio da Marinha e Ultramar. Comissão de Cartographia, Lisbon, 1891. [Presented by the Comissão de Cartographia, Lisbon.]

AMERICA.

Lange, H.—Karte von Süd-Brasilien mit Angabe der Eisenbahnen. Von H. Lange. Scale 1:5,250,000 or 71·9 geographical miles to an inch. Berlin, Simon Schropp'schen Hof-Landkarten-Handlung, J. H. Neumann, 1891. Price 1s. 6d. (Philip & Son.)

Raimondi, A.—Mapa del Perú. Scale 1:500,000 or 6·8 geographical miles to an inch. Grabado y Imp. por Erhard Fries, Paris. Price 2d. 10s. (Dulau.)

This map is in course of publication, and when completed will consist of 34 sheets. It is printed in colours, the rivers and lakes in blue, the forests in green, and the hills in brown. It is nicely drawn, the hill shading is very effective, and at the bottom of each sheet a full explanation is given of the conventional signs employed.

CHARTS.

Lobito.—Plano hydrographico da Bahia de —, Provincia d'Angola. Scale 1:10,000 or 7·3 inches to a geographical mile. Levantado em Abril pelos Officiaes da Armada Fontoura, Newton E. A. Valle. Ministerio da Marinha e Ultramar. Comissão de Cartographia, 1891, Lisbon. [Presented by the Comissão de Cartographia, Lisbon.]

North Atlantic Ocean.—Pilot Chart of the —, December 1891.—Transatlantic Steamship Routes, Supplement to the Pilot Chart of the North Atlantic Ocean, December 1891. Published at the Hydrographic Office, Navy Department, Washington, D.C. Richardson Clover, Lieut. Comdr. U.S.N., Hydrographer. [Presented by the U.S. Hydrographic Office.]

ATLASES.

Bartholomew, J. G.—The English Imperial Atlas and Gazetteer of the World. By J. G. Bartholomew, F.R.S.E., F.R.G.S. London, T. Nelson & Sons. Price 12. 1s. [Presented by the Publishers.]

Of the 220 maps and plans which this atlas contains, a large number are specially devoted to the British Empire, which, generally speaking, is treated in a careful manner. It is therefore to be regretted that so important a colony as New Zealand should not have been represented by larger and more detailed maps, and it is to be hoped that in any future edition, larger scale maps of this colony will be given. As regards the general geography of the world, some of the maps are altogether new, and all have been carefully revised. The astronomical diagrams and physical maps are all good. The gazetteer which accompanies the atlas, contains the results of the recent census returns, and gives the names of about 55,000 places, which are briefly described. It does not, however, indicate in a sufficiently clear manner their locations on the several maps, and this must be regarded as a serious draw-

back, so far as the great majority of persons are concerned. The maps are all drawn in a remarkably clear style, they are not overcrowded with the names, the lettering is well chosen, carefully placed, and, taken as a whole, this is a very good and cheap atlas.

Johnston, W. & A. K.—Royal Atlas of Modern Geography. Edition in monthly parts. Part II. W. & A. K. Johnston, Edinburgh and London, 1891. Price 4s. 6d. each part. [Presented by the Publishers.]

The second issue of the Royal Atlas, in monthly parts, contains the northern sheet of England and Wales, a map of Switzerland, on which all means of communication have been brought up to date, and indices. Publishing the indices with the maps is an improvement on the usual system of keeping them back until the completion of the atlas, as it affords facilities for reference as soon as the maps are issued.

— The World-Wide Atlas of Modern Geography, Political and Physical, containing one hundred and twelve plates and complete Index. With an Introduction by J. Scott Keltie. W. & A. K. Johnston, Edinburgh and London, 1892. Price 7s. 6d. [Presented by the Publishers.]

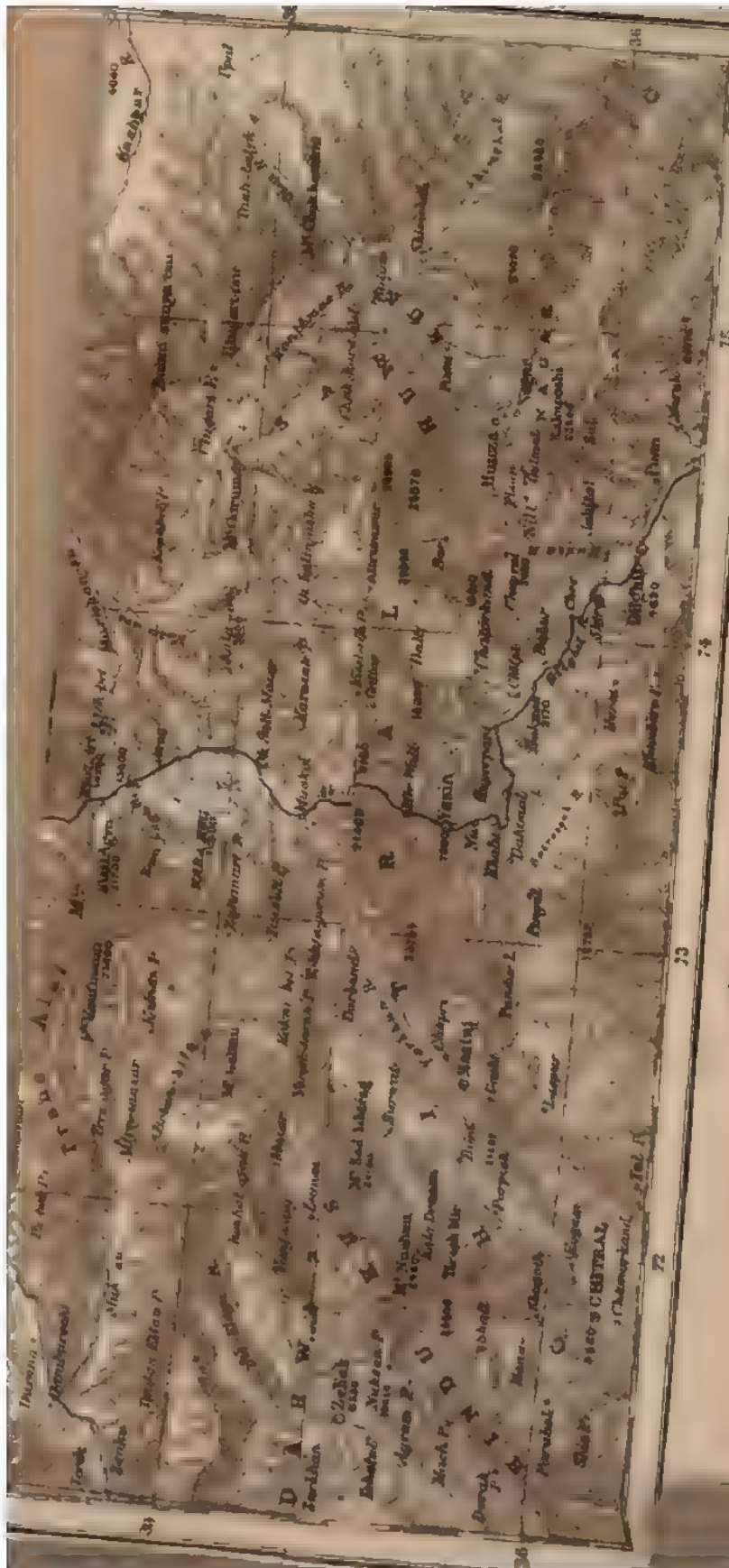
A leading feature in this atlas is the number of plans of towns and harbours which are given. There are also physical maps, orographically coloured, and it is furnished with a copious index. The introduction, by Mr. J. Scott Keltie, contains a concise account of the greater territorial changes to which states have been subjected, and the more important geographical discoveries. This is a valuable addition, and cannot fail to be useful to the class of students for whose use this atlas has been published. The maps, generally speaking, are clearly drawn, many of them being on a much larger scale than is usual in atlases of similar size.

Universal Atlas, The—, complete in 28 parts, including Index. London, published by Cassell & Co., Limited, for the Atlas Publishing Co., Limited. Part 9. Price 1s. [Presented by the Publishers.]

The present issue of this atlas contains three maps and eight insets. Sheet 85 is a map of China and Japan, on which notes are given on political divisions, explanations of the nomenclature, the symbols employed, and plans of the environs of Peking and Tokio on an enlarged scale. Sheet 86 is a map of Japan on which the names of provinces are indicated by numbers corresponding with those given in a table. The northern portion of Yezo, the Liu Kiu, and the islands to the south are given on insets. Sheet 69 is a map of the Balkan Peninsula, on which the importance of towns, as regards population, is indicated by symbols, capitals of states being underlined, and in Greece the names and boundaries of Nomarchies are both given.

PHOTOGRAPHS.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given. In response to this notice many valuable photographs have been presented; the collection, however, is at present far from being complete, one of its greatest deficiencies being the entire absence of any photographs of Asia Minor.



Mapa de la Provincia de la Real Audiencia de Santa Fe

1763

100

PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Memorandum on the Society's New Map of Persia.

By the Hon. GEORGE CURZON, M.P.

Map, p. 140.

A YEAR and a quarter ago the Council of the Royal Geographical Society consented, at my instance, and in continuation of a scheme which they had sanctioned and (in the case of the map of Tibet) already in part commenced, to order the execution of an entirely new map of Persia. The reasons which induced them to take this step were, firstly, the absence of anything like a reliable map of that country, embodying the results either of recent travels by private individuals, or of the more authoritative surveys conducted by emissaries of the British and Russian Governments; secondly, the increasing interest that is felt in the kingdom of the Shah, and the growing extent to which it is yearly visited and explored by Englishmen; and thirdly, the command, of which I was able to assure them, of as complete a collection as is procurable of the necessary materials. Influenced by these considerations, the Council graciously acceded to my request, and placed in my hands the execution of the proposal. Mr. W. J. Turner, F.R.G.S., whose intelligent and painstaking work has frequently appeared in the Society's 'Proceedings,' was specially retained to construct the map; and the sheet to which these paragraphs stand in the relation of an explanatory memorandum, is the result of our combined labours, which, if they are often imperfect, and possibly sometimes—from the circumstances of the case—inaccurate, have yet been conscientiously pursued, and mark, I would fain hope, a decided advance upon any previous map on the same scale of the countries concerned.

The materials which I had collected, and of which a tabulated catalogue will be appended, fall under four headings:—(1) Published English maps, and, in the case of the sea-coast, Admiralty charts; (2) similar Russian and German maps—of which the former, relating principally to the regions bordering on their own dominions (the Russian maps of the rest of Persia being as a rule very meagre and

inadequate), are the result for the most part of semi-official surveys; while the latter are generally compilations from the most recent materials, from whatsoever source derived; (3) maps constructed by, or in the possession of the Intelligence Departments, both in London and Simla, which have been most courteously placed at my disposal; and (4) the surveys or itineraries of travellers, published either in books or in the Proceedings of Geographical Societies, whether in England or on the Continent.

As regards the preference assigned to this over that material, surveys have of course invariably been preferred to reconnaissances, and the more detailed to the less detailed or unscientific surveys; later material has naturally claimed a larger share of notice than earlier, though cases have occurred where the labours of a remote explorer have passed into quite undeserved oblivion, and have been found to contain more minute and accurate information than the accepted commonplaces of later maps. In the cases—how frequent I should hardly like to confess—where our authorities have disagreed, the *pro*s and *con*s have not been lightly balanced before a decision was made.

The scale adopted is 60 miles to the inch, which is uniform with that already applied to the Society's large map of Tibet, still in course of execution; and which, while presenting a sheet rather larger than Keith Johnston's Royal Atlas, can yet be folded into a size, handy both to the traveller and to the student.

Of the scientific value of the work upon which all Persian cartography has hitherto been based, it is undesirable that an incorrect impression should prevail. No Persian survey has ever been made or anywhere exists, in the same sense as it does, not merely in British India, but in the contiguous countries of Afghanistan and Beluchistan, to which the principles of a detailed survey by means of accurate triangulation have been applied by British officers. There a number and network of points and landmarks have been fixed, providing a mathematical framework for all subsequent topography. It is not so in Persia. No triangulation has been attempted here. The presence of the Indo-European Telegraphic Staff has availed to determine the longitude and latitude of important centres; but over the bulk of the country surveys have been conducted with such instruments as independent travellers happened to possess, chiefly with plane-tables, sometimes with the aid of prismatic compasses, traverses, or astronomical observations; the nature of the instruments employed not being stated in every case. The result is that Persian surveys so far constitute a sort of medley or patchwork, the same scale not being uniformly observed, and the observations of different travellers failing to correspond. Scientific precision, therefore, cannot as yet be predicated of any Persian map-making; and future labours will doubtless disturb several of the conclusions at which we have arrived. The utmost that

can so far be claimed even for the best Persian map is approximate fidelity to the truth.

So much for the technical bases of our operations. I pass now to the rules which I have observed in delineating the topography of the accompanying map.

Mountains I have purposely refrained from indicating as darkly as their height above the sea-level might seem to justify, for fear of encumbering the ground, and obscuring or extruding the more necessary names of places. Every tyro will know that the normal level of the Persian plateau is from 3000 to 5000 feet above the sea; and that what may in consequence appear on the map to be a plain, is commonly an elevated upland between more or less neighbouring ranges of mountains. The true altitude of the latter will be judged of in relation thereto.

Rivers, in such parts of their courses as have not actually been followed or surveyed, I have indicated by broken lines -----; the number of which will illustrate the extent to which there is still need for the explorer's services.

The recognised caravan routes and mule-tracks (except in the neighbourhood of the capital, there are no roads in Persia) have been marked by single lines, following their course. Where, however, they only exist upon hearsay—and that as a rule the not too veracious gossip of muleteers—I have departed from the example set in previous maps, and have as a rule excluded them; such hypothetical routes being more frequently a snare than an assistance to the traveller.

In the selection of names of places for insertion, I have necessarily been compelled to exercise a somewhat arbitrary choice. I might easily, from the large-scale maps which have been placed at my disposal, have crammed the superficies of this map with threefold or fourfold the number of names. In the East, however, small villages and nomad camps are constantly shifting or disappearing; in desert regions, a name in many cases indicates little more than a caravanserai or a well; and I have accordingly given the preference to the recorded experiences of the most recent travellers; my principal desire being not unduly to crowd the surface, or to represent as a teeming centre of population what the exasperated traveller would find upon approach, to be only a waste expanse, with widely scattered and fugitive evidences of life.

I have inserted the altitudes of the principal cities and mountains; and have marked the course of the Indo-European Telegraphic wires from Tiflis via Tabriz and Teheran to Bushire (as also the branch line, maintained by a British staff, from Teheran to Meshed), of the submarine cables in the Persian Gulf, and of the land-line from Jask along the coast of Mekran to Kurrachi. The Persian telegraphic wires I have thought it superfluous to introduce.

The only two railways in Persia, from Mahmudabad on the Caspian

to Amol, 12 miles, and from Teheran to Shah Abdul Azim, 6 miles, are marked.

Of political frontiers or lines of demarcation I must speak at rather greater length. I have not inserted any provincial boundaries in Persia itself, for the reason that the administrative subdivisions are not fixed, as in England, by topographical conditions, but are determined by political exigencies, and vary very much from time to time. As regards external frontiers, I have, after much consideration, adopted a fourfold system of delineation, answering to the four classes of border which I shall show to exist either in Persia or in the adjacent countries that also appear on this map. They are as follows:—

(1) This indicates a boundary that has been formally defined and demarcated: i.e. a boundary which exists in treaty stipulations, and is as a rule marked by pillars. Of such a character are (a) the Perso-Russian frontier in the north-west, to Astara on the Caspian; (b) the Perso-Russian frontier as regulated by the Akhal-Khorasan treaty of 1881, from Hasan Kuli Bay in the Caspian to Lutfabad, on the Transcaspian Railway; (c) the Perso-Afghan or Seistan frontier, fixed by Sir F. Goldsmid in 1872, from the Hamuns to the Kuh Malek-i-Siah; (d) the Perso-Beluch or Mekran frontier, as fixed by the same officer and demarcated by the late Sir O. St. John, at the same time, from south of Kuhak to the sea at Gwotter; (e) outside Persia—the Russo-Afghan frontier, from Zulfikar on the Heri Rud to Bosaga on the Oxus, fixed by the Anglo-Russian Commission in 1885-7.

(2) Boundaries nominally defined but not uniformly demarcated. The solitary instance of this is the long frontier-line of 700 miles between Persia and Turkey, from Mount Ararat to the Shat-el-Arab, which was roughly determined by an Anglo-Russian Commission, after labours that were spread over a period of more than twenty years (1843-65), as existing somewhere within a strip of territory varying from 20 to 40 miles in width, the actual line to be determined by the two Governments implicated, either by agreement or by force as they pleased. In some cases one, in others the other agency has been employed; with the result of frequent squabbles and general lack of precision.

(3) Hypothetical boundaries, i.e. boundaries which more or less exist, and are more or less recognised, either by custom or because of physical conditions, but the acceptance of which has either never been made, or is not publicly known to have been made, the subject of diplomatic agreement between the powers concerned. To this class belong: (a) the Perso-Russian frontier in North-east Khorasan from Lutfabad to Sarakhs, and up the Tejend to Zulfikar, which is alleged to have been determined by secret treaty, but appears more probably to have been left open, so as to justify future Russian encroachments; (b) the Perso-Afghan frontier from Zulfikar to the Seistan Hamuns (c) the Perso-Beluch frontier from Jalk to Kuhak—nominally

fixed by Goldsmid and St. John, but never demarcated and constantly fluctuating; (d) outside Persia—the Afghan-Beluch frontier from the Kuh Malek-i-Siah to the neighbourhood of Nushki—a boundary which is doubtfully observed and can only be approximately ascertained; (e) the frontier of British India running from the neighbourhood of Nushki via Chaman, to the Gomul Valley on the east fringe of my map—a frontier which is as yet only tentatively defined, but which indicates, with sufficient accuracy, the tribes and districts at present brought under British sway.

(4) My fourth class of boundary, if a bull may be permitted, is a blank. By no other means can I express the impalpable and non-existent border-line between the extreme points of Goldsmid's Seistan and Mekran delimitations. Most map-makers solve the difficulty by drawing and colouring a straight line from the Kuh Malek-i-Siah to Jalk; but this is absurd, and the Beluch nomads who wander over this region, and profess either an alternating allegiance or none at all, would scoff at the suggestion, and probably kidnap the innocent cartographer who went out to ratify his theories on the spot.

In the first, second, and third of the above classes, where the boundary follows the course of a river, it is not separately indicated, but must be identified with the river channel.

Finally I come to the vexed question of Orthography. Here, broadly speaking, I have observed the rules laid down by this Society; i.e. I have retained the conventional spelling of such names (even if strictly incorrect) as have been fixed by long custom, e.g. Bushire *vice* Abu Shehr, Meshed *vice* Mashhad, &c.; while vowels should ordinarily be pronounced as in Italian, and consonants as in English. Subject to these two conditions, I have tried to represent the native sounds with as much accuracy as the very imperfect symbols of the English alphabet will admit of, preferring on the whole to incur the charge of looseness to that of pedantry. Such a system must result in an orthography that is at times arbitrary, and that will not uniformly commend itself to every student. It is difficult indeed to secure uniformity in a country or countries where there are constant slight differences of pronunciation or inflexions of tone, according to the language or dialect locally in vogue; and the difficulty is increased in the case of Persia by the fact that the Indian pronunciation of Persian names, with which Englishmen are more apt to be familiar, is not that encountered in Persia itself. I may instance as illustrating the various pronunciations of the same vowel, the word *panj*, *punj*, or *penj*, i.e. five, which in the different forms Kila Bar Panja, Panjgur, Punjab, and Penjdeh, is familiar to English readers. The system employed in Hunter's Gazetteer of India, and in India generally, I have not, for the above-mentioned reasons, been able unreservedly to adopt. It frequently violates the primary canon of such an approxima-

tion to the local sound as a native, if he heard the word in an Englishman's mouth, might be expected to understand.

It will be observed that in addition to Persia this map includes a large portion of the Russian dominions in Central Asia, the greater part of Afghanistan, and the whole of Beluchistan. The geographical configuration of Persia, considered in relation to a handy and portable sheet, would of itself have suggested such an extension of plan; but the reasons for which I have adopted it are political rather than ornamental or convenient. Persia is so intimately bound up with its neighbours on the north-east and east, and its future will so largely be determined by considerations in which their geography and topography must play an important part, that the map would have been shorn of much of its value had it omitted to include them. Russian authorities have been used for the Russian dominions; Indian authorities for the Indian frontier-regions and the countries immediately beyond.

I append a twofold list, (1) of the maps that have been directly used in the compilation of this work; (2) of the maps that have not required to be so used, inasmuch as their contents have already been incorporated in the members of class I, but that deserve to figure in a catalogue of modern maps of Persia. I have subdivided the former or more important class, firstly into the political and geographical units of Persia, Afghanistan, and Beluchistan; and secondly, according to the character and extent of the area or itinerary displayed, into General maps, Divisional maps, and District or Route maps. This is not an unfamiliar classification, and appears to cover the whole ground.

I.—LIST OF MAPS DIRECTLY USED IN THE COMPILATION OF THE MAP.

PERSIA.

Title of Map.	Author.	No. of Sheets.	Scale of Miles to inch.	Place and Date of Publication.
A. GENERAL MAPS.				
Parts of Arabia and Persia	Trig. Survey of India...	2	32	Calcutta, 1883.
Provinces Asiatiques de l'Empire Ottoman.	H. Kiepert	6	23	Berlin, 1884.
Persia	Intell. Dir. War Office..	6	16	London, 1886.
Persia	Russian Milit. Staff Map.	12	13½	St. Petersburg, 1871-89.
Persia	Intell. Dir. War Office..	6	16	London, 1890.
N.W. Trans-Frontier* ..	Intellig. Dept. India ..	13	8	Calcutta, 1889-91.
S.W. Asia*	Ibid.	9	8	Ibid.

* In addition to public authorities elsewhere cited, these maps embody the results of unpublished surveys and reconnaissances by Major T. H. Holdich, Captain Hon. M. G. Talbot, Captain St. O. Gore, C. L. Griesbach, Col. G. C. Sartorius, Col. M. E. Genard, Lieut. H. B. Vaughan, and Lieut. R. E. Galindo.

PERSIA—continued.

Title of Map.	Author.	No. of Sheets.	Scale of Miles to Inch.	Place and Date of Publication.
B. DIVISIONAL MAPS.				
Caspian Sea	Russian Chart	1	13½	St. Petersburg, 1867.
N.E. Frontiers of Persia	Col. V. Bakor & Lieut. W. J. Gill.	1	30	London, 1874.
N. Frontier of Khorasan, with parts of Irak and Mazandern.	Capt. Hon. G. Napier ..	1	16	Ibid., 1876.
Khorasan & Neighbouring Countries.	Col. C. E. Stewart (Proc. R.G.S., Sept. 1881)	1	24	Ibid., 1881.
Aderbeijan	N. Khanikoff (1851-55) (H. Kiepert).	1	13	Berlin, 1862-82.
Route in Nord-Persien: Kurdistan und Irak.	Prof. C. Hausknecht (1865-9) (H. Kiepert).	1	24	Ibid., 1882.
Routes in Orient: Irak, Persien und Lunstan	Ibid.	1	18	Ibid., 1882.
Ibid., Strasse von Teheran nach Ispahab.	Ibid.	1	18	Ibid., 1882.
S. Persia	E. A. Floyer (1876-7), in 'Unexplored Beluchistan.'	1	56	London, 1882.
Caucasia	Russian	6	13½	Tiflis, 1883.
Transcaspian Region ..	Russian	9	13½	St. Petersburg, 1885.
The Afghan and Persian Border	Col. C. E. Stewart (Proc. R.G.S., March 1886).	1	32	London, 1886.
Routes in S.W. Persia ..	Col. M. S. Ball (1885) ..	4	8	Calcutta, 1886.
Routes in W. Persia ..	Lieut. F. B. Maunsell (1888).	6	8	Ibid., 1889.
Russian Central Asia ..	Hon. G. Curzon (Proc. R.G.S., May 1889).	1	92	London, 1889.
Persian Gulf	Admiralty Charts, No. 2437a & b (Com. C. G. Constable & Lieut. A. W. Stiffe).	2	14	Ibid., 1860-90
The Bakhtiari Country ..	Maj. H. O. Sawyer (1890)	1	8	Calcutta, 1891.
C. DISTRICT MAPS, ROUTES, & ITINERARIES.				
Zobab to Khuzistan ..	Major H. C. Rawlinson (Journ. R.G.S., 1839).	1	51	London, 1839.
Kazrun to Shushier ..	Baron C. A. De Bode (Journ. R.G.S., 1843).	1	28	Ibid., 1843.
Khuzistan	A. H. Layard (Journ. R.G.S., 1846)	1	50	Ibid., 1846.
Chart of the Karun River about Ahwaz.	Lieut. W. B. Selby (1843-5).	1	5	Ibid., 1846.
The Shatt-el-Arab and River Karun.	Col. F. R. Chesney ..	2	4	Ibid., 1849.
Isfahan to Shiraz	Keith Abbott (1849-50) (Journ. R.G.S., 1855).	1	44	Ibid., 1855.
Herat to Bushire	Capt. Claude Cleric (Journ. R.G.S., 1861).	1	70	Ibid., 1861.
Route from Isfahan to Charbar and Bunder Abbas.	Col. F. J. Goldsmid and Major R. M. Smith.	1	26	Ibid., 1866.
E. Persia; Bunder Abbas to Meshed.	Col. F. J. Goldsmid (Journ. R.G.S., 1873).	1	51	Ibid., 1873.
Route-map from Jask to Bampur.	E. A. Floyer (1876) (Journ. R.G.S., 1877).	1	30	Ibid., 1877.

PERSIA—continued.

Title of Map.	Author.	No of Sheets.	Scale of Miles to Inch.	Place and Date of Publication.
Sketch-map of Tour in Fars.	Capt. E. L. Darand ..	1	7½	Calcutta, 1879.
Khorasan	Col C M. MacGregor (1875) ('Travels in Khorasan,' 2 vols.)	1	32	London, 1879
Routen im Nordwestlichen Persien; Teheran nach Burujird.	A. Houtum-Schindler (1877-8) (Zeit. d. Gesell. f. Erd. z. Berlin, 1879).	1	9½	Berlin, 1879.
Routen im Nördlichen Persien; Teheran nach Resht.	Ibid.	1	9½	Ibid., 1879
Ibid., Semnan nach Meshed.	Ibid. (1876)	1	9½	Ibid., 1877.
Routen im Südwestlichen Persien; Shushter nach Isfahan.	Ibid. (1877-8)	1	9½	Ibid., 1879.
Ibid.; Shushter nach Burujird.	Ibid.	1	9½	Ibid., 1879.
Ibid.; Burujird nach Isfahan.	Ibid.	1	9½	Ibid., 1879.
Routen im Südlichen Persien; Teheran nach Isfahan.	Ibid. (1879-80)	1	12	Ibid., 1881.
Ibid.; Isfahan nach Bunder Abbas.	Ibid.	1	19	Ibid., 1881.
Kasvin nach Tabriz ..	Ibid. (1881-2)	1	16	Ibid., 1883
Zinjan nach Takht-i-Sulaiman.	Ibid.	1	8	Ibid., 1883.
Tabriz nach Suj Bulak ..	Ibid.	1	8	Ibid., 1883.
Bushire to the Caspian Sea.	E. Stack ('Six Months in Persia,' 2 vols.)	6	16	London, 1882.
Route along the Alburz Mts between Teheran, Astrabad, and Shahrud.	Lieut.-Col. B. Lyett (1881-2) (Proc. R.G.S., Feb. 1883).	1	8	Ibid., 1883.
Routes in S.W. Persia: Isfahan to Shushter, Shiraz, and Lake Bakhtegan.	Captain H. L. Wells (1881-2) (Proc. R.G.S., March 1883).	1	8	Ibid., 1883.
The Kara Agatch river in S. Persia.	Col. E. C. Ross (Proc. R.G.S., Dec. 1883).	1	32	Ibid., 1883.
Kasvin to Hamadan ..	J. D. Rees	1	12	Madras, 1845.
Part of S. Persia from Shiraz to Jask.	J.R. Prence (1884) (Supp. Papers R.G.S., 1885).	1	20	London, 1885.
Country between Teheran and Kum.	(Proc. R.G.S., Oct. 1888).	1	12	Ibid., 1888.
Itinerary, Anzali to Astrabad.	Capt. Bailward (Russian Map)	1		1889.
Karun River and branches Across Luristan to Isfahan.	(Proc. R.G.S., Sep. 1890)	1	8	London, 1890.
	H. B. Lynch (1889) (Proc. R.G.S., Sep. '90).	1	8	Ibid., 1890.
Route through Central Persia; Langah to Bajistan.	Lieut. H. B. Vaughan (Proc. R.G.S., Oct. '90).	1	48	Ibid., 1890.
Route from Teheran to Bushire.	Capt O. St. John and Major H. L. Wells (Indo-Europ. Telegraph Map)	1	8	Calcutta, 1871-80.
Reconnaissance from Delhid to Bushire.	Major H. O. Sawyer ..	1	8	Calcutta, 1890.
The Kur River in Fars ..	A. H. Schindler (Proc. R.G.S., May 1891).	1	26	London, 1891.

AFGHANISTAN.

Title of Map.	Author.	No. of Sheets.	Scale of Miles to Inch.	Place and Date of Publication.
A. GENERAL MAPS.				
Persia, Afghanistan, and Beluchistan.	Russian	6	33	St. Petersburg, 1887.
Afghanistan	Surv.-Gen. of India ..	4	24	Calcutta, 1889.
B. DIVISIONAL MAPS.				
Tejend Oasis and Roads to Merv.	Col. Baron Aminoff (Proc. R.G.S., Jan. 1883).	1	27	London, 1883.
Country between Hari Rud and Murghab River.	Ibid.	1	35	Ibid.
Hari Rud and Murghab Rivers, and territory between Merv and Herat.	(Proc. R.G.S., Sep. 1885).	1	III	London, 1885.
S.E. part of Afghanistan ..	Lieut. G. Broadfoot (Suppl. Pap. R.G.S. 1885).	1	14	London, 1885.
N.W. Afghan Boundary ..	Major T. H. Holdich (Parl. Pap. Central Asia, No. 1, 1887).	3	4	London, 1887.
Russisch - Afghanischen Grenzgebiete.	Ibid. ('Petermann's Mittheilungen').	1	20	Gotha, 1887.

BELUCHISTAN.

A. GENERAL MAPS.				
Beluchistan	Surv.-Gen. of India ..	2	16	Calcutta, 1876.
Beluchistan	Ibid.	1	32	Ibid., 1886.
B. DIVISIONAL MAPS.				
Route-map, Kurrachee to Gwadar.	Major F. J. Goldsmid (Journ. R.G.S., 1863).	1	15	London, 1863.
Parts of Beluchistan, Mekran, and the Perso-Beluch Boundary.	Capt. B. Lovett	1	II	Ibid., 1872.
Sind	Surv.-Gen. of India ..	1	16	Calcutta, 1877.
Sind and Punjab Frontier	Intell. Dep. India ..	1	8	Ibid., 1879.
Country between Sind and Kandahar.	(Proc. R.G.S., Sep. 1880)	1	24	London, 1880.
Reconnaissance across the Desert of Beluchistan.	Col. C. M. MacGregor and Capt. R. B. Lockwood (1877) ('Wanderings in Beluchistan.')	1	III	Ibid., 1882.
W. Beluchistan	Capt. R. H. Jennings ..	1	III	Calcutta, 1886.
Arabian Sea	Admiralty Chart No. 38.	1	14½	London, 1874-90.
Coasts of Sindh and Kutch.	Ibid., No. 42 (Lieut. A. M. Grieve).	1	11	Ibid., 1850-90.

II.—LIST OF MAPS NOT DIRECTLY USED IN COMPILATION OF NEW MAP OF PERSIA, BECAUSE EITHER SUPERSEDED OR ALREADY EMBODIED IN MAPS MENTIONED IN CLASS I.; BUT USEFUL FOR PURPOSES OF REFERENCE.

PERSIA.

Title of Map.	Author.	No. of Sheets.	Scale of Miles to Inch.	Place and Date of Publication.
Boundary between Persia and Turkey.	H. A. Churchill	1	24	London, 1855.
N.E. Persia	N. Khanikoff (1858-9) .	1	48	Paris.
Persian Gulf, &c. .. .	Rev. G. P. Badger .. .	1	93	London, 1871.
Route, Sistan to Meshed	Gen. F. J. Goldsmid .. .	1	8	Calcutta, 1872.
Persia	Major O. B. St. John .. .	6	16	London, 1875.
Journeys through Persia	Col. C. MacGregor .. .	1	16	Calcutta, 1875.
Khuzistan	Intell. Div. War Office ..	1	4	London, 1875.
N.E. Persia and Herat Valley.	Major O. B. St. John .. .	1	12	Calcutta, 1878.
Persia, Afghanistan, Beluchistan.	H. Kiepert	1	41½	Berlin, 1878.
Russisch-Persischen Grenze	(‘Petermann’s Mitteil.’)	1	13½	Gotha, 1884.
Topographie von Persien	Von Tomaschek	1	15½	Vienna, 1885.
Persia and Afghanistan ..	Keith Johnston	1	68	Edinburgh, 1889.
Persia, Afghanistan, and Beluchistan.	(Phillips’ Travelling Maps)	1	62	London, 1891.
Iran und Turan	(Stieler’s Atlas)	1	118	Gotha, 1891.

Why are the Prairies Treeless?

By MILLER CHRISTY, F.L.S.*

ALL who are familiar with the Prairies of the West must, I think, have asked themselves at times the question which stands at the head of this paper:—Why are the Prairies treeless? That treelessness is an essential characteristic of prairies, of course does not need stating; but the fact does not carry with it any explanation of itself.

In America, at least, as one writer has observed,† “there has been no lack of literature on the subject of the prairies of the Western States and Territories, nor any dearth of theories to account for their origin. We have had their existence ascribed to fire and to water; to heat and to cold; to all sorts of phenomena and to the lack of them. It has been held that the forests that once clothed these regions must have been burned up by prairie fires — before the prairies existed; that they must have been drowned out by the waters of vast inland lakes that once covered these prairie states; that they must have been parched up by the dryness of the climate; that they must have been smothered

* An abstract of this paper was read at the Geographical Section of the British Association, Cardiff Meeting, last August.

† ‘American Naturalist,’ vol. xii. (1878) p. 299.

by the impalpable fineness of the soil in which they grow; that they never had any existence; and that the seeds which ought to have produced them must have been ground to pumice by the glaciers of the age of ice, or hopelessly buried beneath their *débris*."

So hotly, indeed, has the origin and treelessness of the prairies been debated in America, that the above statement, though humorous, is not exaggerated. Naturally, however, the subject has received far less attention on this side of the Atlantic, and there is no work published in this country which fully presents all the aspects of the question.

It is first necessary to make two explanations. In speaking of prairies, I refer to the *true prairies* only, and not to the arid, sterile region now commonly spoken of as the Great Plains, but formerly called the Great American Desert. It is very common for people to confound the *Prairies* of North America with the *Plains*; but this should on no account be done; for the prairie-region has features and characteristics quite different from those of the plain-region.

The true prairies may be said to be confined to the valley of the Mississippi; for, although the prairie-region extends to the northwards, beyond the international boundary-line, far into Canada, where it occupies a large part of the valleys of the Red River and the Saskatchewan, the valley of the former river at least may (for present purposes) be regarded as a continuation northward of the valley of the Mississippi, though with a different slope.

Broadly speaking, the prairie region of North America covers the southern portions of Michigan and Wisconsin; the western portions of Ohio, Kentucky, and Tennessee; the eastern portions of Texas, the Indian territory, Kansas, and Nebraska; the whole of Indiana, Illinois, Arkansas, Missouri, and Iowa; the eastern halves of the State of Minnesota and the Canadian Province of Manitoba; Dakota as far west as the Missouri river; and all the North-West Territories of Canada, south of the Saskatchewan river, as far west as the 104th degree of west longitude. On the north, the prairie region passes into the great sub-arctic pine forest; on the east, into the light deciduous forests and cultivated lands of the eastern States; on the south, into the low marshes around the mouth of the Mississippi river; and, on the west, it everywhere passes more or less abruptly into the higher and more arid region of the Plains.

In the region of the Upper Mississippi and the Red River, the true prairies may be said to occupy the first and second of what are usually known in that region as the "Three Prairie Steppes."

The most striking features of the true Prairies are, of course, their treelessness, in spite of their excessive fertility, their level surface, their abundant growth of grasses, and the fact of their being (taken as a whole) well-watered.

The true Plains, on the other hand, are remarkable for their very

slight rainfall, their light sterile soil, their scant covering of grass, and their greater elevation. Roughly speaking, the true plains occupy all the country between the prairies and the Rocky Mountains, and even beyond "where [as Prof. Hind says] both soil and climate unite in establishing a sterile region."

What I shall hereafter say as to the cause of the treelessness of the prairies does not apply also to the plains, which are probably treeless through different causes altogether.

I am able to claim more or less personal acquaintance with by far the greater portion of the prairie area. The only part I have never visited is the south. With the northern portion I am fairly well acquainted, especially with Minnesota, Dakota, Manitoba, and the Northwest Territories of Canada, to all of which I have paid many visits. I state this merely to show that I am not treating theoretically of a subject of which I have no personal knowledge. Further, I think I may claim that that part of the prairie region with which I am most familiar is the only part in which the cause to which I attribute the treelessness of the prairies may be now properly observed, the long settlement of the more southern portion having altogether removed and obliterated that cause.

One further explanation is needed here: In speaking of the treelessness of the prairies, I of course do not forget that, even in many truly prairie areas, the swampy parts and islands in lakes are often timbered, while belts of trees fringe most of the streams, and groves of trees often appear upon the open prairie. In Manitoba, these groves are known as "bluffs," by which name I shall often have occasion to speak of them. The existence of these trees, however, in no way affects my main contention.

We now come to the consideration of the question--Why are the prairies treeless? But, before stating my own view, it will be well to explain and discuss the principal of the many views on the subject which have been expressed by others.

Perhaps the most reasonable of these views is that of Prof. Leo Lesquèreux, who takes the view,* that prairies have all been lake-beds. "This peculiarity of formation," he says, "explains first the peculiar nature of the soil of the prairies. It is neither peat nor humus, but a black soft mould, impregnated with a large proportion of ulmic acid, produced by the slow decomposition (mostly under water) of aquatic plants, and thus partaking as much of the nature of peat as of that of the true humus. . . . It is easy to understand why trees cannot grow on such kind of ground. The germination of seeds of arborescent plants needs free access of oxygen for its development; and the trees, especially in their youth, absorb by their roots a great amount of air, and demand a solid point of attachment to fix themselves. . . . Considering the

* 'Geological Survey of Illinois,' vol. I. (1886) p. 246.

whole explanation of the formation of the prairies, as it is exposed in this paper. I think that it covers the whole ground and applies to most of the cases (if not to all) where the ground is naturally naked, or without trees."

Another ingenious theory is that of Professor J. D. Whitney, of the Geological Survey of Iowa.* After expressing his opinion that the theory I shall hereafter support is entirely untenable, and after bringing forward evidence showing the unsoundness of the view, advanced by some, "that the want of sufficient moisture in the air or soil was the cause of the absence of forests in the North-west," the Professor proceeds as follows:—

"Taking into consideration all the circumstances under which the peculiar vegetation of the prairie occurs, we are disposed to consider the nature of the soil as the prime cause of the absence of forests. . . . And, although chemical composition may not be without influence, . . . yet we conceive that the extreme fineness of the particles of which the prairie soil is composed is probably the principal reason why it is better adapted to the growth of its peculiar vegetation than to the development of forests. . . . The soil and superficial material have been so finely comminuted as to be almost in the state of impalpable powder. If we go to a thickly-wooded region, . . . we shall observe that the beds of ancient lakes . . . remain as natural prairies and are not trespassed upon by the surrounding woods. We can conceive of no other reason for this than the extreme fineness of the soil which occupies these basins. . . . Applying these facts, . . . we infer (on what seem to be reasonable grounds) that the whole region now occupied by the prairies of the North-west was once an immense lake, in whose basin sediment of almost impalpable fineness was gradually accumulated. . . . On the prairie, we meet sometimes with ridges of coarse material, apparently deposits of drift, on which (for some local cause) there has never been an accumulation of fine sediment; in such localities we invariably find a growth of timber. This is the origin of the groves scattered over the prairies."

Prof. Alexander Winchell, of the University of Michigan, has promulgated a curious theory which may be summed up in his own words:† —

"We may discover the origin of the prairies in the last great geological revolution of the globe. . . . There are two facts to be accounted for: 1st, the physical peculiarities of the soil and subsoil of the prairies; and 2nd, the absence of trees from those areas, in cases where no obvious cause exists. (1) The soil of the prairies is a lacustrine formation; (2) lacustrine sediments enclose but few living

* 'Report on the Geological Survey of Iowa,' vol. i. (1858) p. 24.

† "On the Origin of the Prairies of the Valley of the Mississippi," in the 'American Journal of Science and Arts,' second series, vol. xxxviii. (1864) pp. 322-324.

germs; (3) diluvial deposits, on the contrary, are found everywhere replete with living germs; (4) the living germs of the diluvial deposits were buried during the glacial epoch; (5) in proportion as the diluvial surface became exposed, the flora of the pre-glacial epoch was reproduced; (6) the vegetation which finally appeared on the drained lacustrine areas was extra-limited, and was more likely to be herbaceous than arboreal."

The number of other theories that have been advanced at different times to account for the treelessness of the prairies is very great; but these theories are, for the most part, more or less improbable. They all leave us face to face with the paradox that in spite of an abnormally fertile soil, a fairly heavy rainfall, a moderate elevation, and a favourable climate and geographical situation generally, vast (and, perhaps, increasing) areas remain permanently treeless, although they produce a rich variety of grasses and other small herbaceous plants.

To the solution of this point, then, let us now turn our attention. My unhesitating belief is that the treelessness of the prairies is due mainly to artificial causes; that the agency by which the prairies have been brought to their present state is chiefly FIRE—one of the best servants and worst masters man ever had.

To the prevalence of prairie fires in the past, I attribute, to a large extent at least, the very existence of the prairies themselves; their dreary treelessness; the extraordinary fertility of their soil, and its fine, black, soot-like texture; the alteration of the flora; and the extermination of certain organic creatures (which are usually abundant in similar situations, and would, I believe, exist now on the prairies had it not been for the fires). The idea that the treelessness of the prairies is due largely to the action of fire is not by any means new. It crops up continually, as an almost accepted fact, in the accounts of travel in the prairie region which the more observant travellers have given us.

Every one is familiar with the stirring tales of the huge fires which occur on the prairies, and of the way in which hunters and travellers are accustomed to "fight fire with fire," when placed in situations of danger. But not a few persons in this country have, I believe, a vague sort of idea that these fires are in some way due to natural agencies; but all the evidence goes to show that they are due to human agency, and there is little or none to the contrary.

Prairie fires, in the first case, originated among the Indians, who, when on their "great fall hunts," used to "put out fire" as a signal to their friends that they had found buffalo, or with the object of more effectually gathering the animals together, by limiting their feeding-ground. Lieut. R. I. Dodge* says, "The Indians burn portions of the prairie (i. e. "the plains" of America) every fall, setting the fire so as to burn as vast an extent of country as possible, and yet preserve

* 'Hunting Grounds of the Wild West,' p. 29.

unburnt a good section in the vicinity where they purpose to make their fall hunt. The buffaloes, finding nothing to eat on the burned ground, collect on that unburnt, greatly reducing the labour of the hunt."

In the present day, however, fires have probably a different origin from those of years past. They are caused in nearly every case by travellers who carelessly neglect to extinguish their camp fires; by persons who maliciously put out fire; or by settlers who do so for the purpose of improving the pasturage the following year, or with the mistaken idea that by burning the grass they lessen the number of mosquitoes.

Fires take place in the spring and autumn. When the buffalo existed, prairie fires mainly took place in the *autumn*, before the winter snows had fallen; but the majority (or, at least, many more than formerly) now come in the *spring*. The reason for this is, that the settlers do not like fire in the fall, because they prefer to keep the pasturage for their cattle until as late a period in the year as possible, and also because there are at that season stacks of corn and hay standing about in every direction; but, in the spring-time, none of these reasons has any force, and the settlers then burn the prairie, as soon as the disappearance of the snow has left the dead grass dry enough to "carry fire."

Towards the end of September, the prairie, which up to that time has been gay with a never-failing succession of brilliant flowers, becomes of a uniform, sombre brown colour. A very abundant, bright blue species of gentian is the last flower to appear; when that is over, nothing remains but a few stray blossoms belonging to an odd assortment of species; while, with the first sharp frosts of autumn, the grass (hitherto green) becomes dead, dry, and highly inflammable. From this time until the first fall of snow (which often does not come till December) is the period when the autumn fires appear; or, if they do not come then, the dead grass remains and can be burned as easily the following spring.

Before visiting the prairies, I had no clear idea as to the great prevalence of the fires, regarding them as occasional occurrences only; but, from what I have seen and heard, I imagine that by far the larger portion of the whole area of the prairies gets burned over annually. Dr. C. A. White, of the Geological Survey of Iowa, speaking of the grasses and other herbaceous plants which grow upon the prairies,* says: "These together cover the ground every season; for the fires of one year do not at all impair or prevent their abundant growth the next. Stringent laws are enacted in all the prairie States against the setting of fire to the prairies; yet each year's growth of grass, upon at least the larger ones, is somehow almost invariably burned." This is not surprising when it is considered that the only conditions required

* 'American Naturalist,' vol. v. (1871) p. 69.

for fire to run over hundreds of miles—or round the world, for the matter of that—are a more or less strong wind behind and a level stretch of dry grass in front. I myself saw a fire which I had reason to believe was 40 miles in length; while Professor H. Y. Hind says: * “From beyond the south branch of the Saskatchewan to the Red River, all the prairies were burned last autumn [1857]—a vast conflagration extending for 1000 miles in length and several hundred in breadth. The dry season had so withered the grass that the whole country of the Saskatchewan was in flames. The Rev. Henry Budd, a native missionary at the Nepowewin, on the north branch of the Saskatchewan, told me that, in whatever direction he turned in September last, the country seemed to be in a blaze. We traced the fire from the 49th parallel to the 53rd, and from the 98th to the 108th degree of longitude. It extended, no doubt, to the Rocky Mountains.”

It is certain, however, that the prairie fires now are not so extensive as formerly, although probably they are more numerous, on account of the very much greater number of persons there are to start them. That their courses should be shorter now than formerly is not due to any increase of the chief natural obstacle to their progress—namely, water, in lakes or streams—but to the amount of ploughed land which now, both in spring and autumn, largely checks their movements; for, on stubble, fire can “run” before a very high wind only.

But, if I have been compelled to enlarge my ideas as to the ordinary frequency and extent of the fires, I have, on the other hand, found it necessary to contract my notions as to their average magnitude. It appears that everything depends on the length of the grass and the strength of the wind. Every settler with the slightest grain of forethought, provides his house and premises with what is known as a “fire-guard.” This is done by the very simple process of turning a few furrows with a plough all round his premises. Many a settler, through the neglect of this precaution, or when he has allowed his fire-guard to become old and overgrown with grass, has suffered the loss of a stack of wheat, oats, or hay, his farm-buildings, or a comfortable house or shanty, built with the labour of his own hands. Not a few persons, whose ideas of prairie fires have been gathered from what they have read, or from pictures in which men, horses, cattle, buffaloes, hares, deer, birds, and what not, are depicted as flying before the flames, may feel disinclined to believe that such a simple precaution could be sufficient to stay the onward progress of a fire; but in most cases it suffices.

On the drier portions of the prairies, the grass is short and scanty, and a fire will not “run” unless there be considerable wind to drive it. Even then it is but a very small affair—merely a narrow flickering line of advancing flame, which might almost be flicked out with a pocket-

* Narrative of the Canadian Red River, Assiniboine, and Saskatchewan Exploring Expeditions of 1857 and 1858, vol. i. p. 292.

handkerchief; and indeed, as a matter of fact, is often brushed out for short distances with a wet sack or broom by settlers anxious to preserve their homes; for, if the fire be stopped along the windward side of a settler's premises, the wind carries the two wings of the fire on past the sides of the buildings; and, although they may eventually join again to the leeward, they cannot then return to burn the premises, unless the wind shifts completely round.

Such small fires as those of which I now speak are often stopped for considerable distances by obstacles of much smaller importance than a settler's fire-guard; for instance, by the numerous "trails," as the prairie roads are called in Canada. These, though merely two narrow wheel-marks with an ox-path in the centre and grass growing between, often stop fires for short distances; but, being able to cross the trail at other spots, the broken line of flame gradually joins again, leaving many triangular patches of unburnt grass on the leeward side of the trail, the apex of the triangle of course pointing in the direction in which the fire has gone.

I saw instances of this one bright moonlight night, when I was travelling over the dry, sandy prairie between Fort Ellis and Elkhorn. The short, scanty grass had been burned by a fire, the lurid glare of which I had plainly seen, miles away, after dark on the previous evening. The trail I travelled on, though but faintly worn, served, nevertheless, to check the fire for 100 yards in some places, so that on one hand I had burned and on the other unburned prairie; but in places the flames had contrived to creep across, and had gone on their way rejoicing. On one occasion, too, I remember seeing a spot where a small fire had been checked, for several yards at least, by the wheels of a waggon having previously crossed its track, pressing down the short grass, though they had left almost no impression on the soil. Such trumpery fires as these are the rule in dry districts; but there are times when the wind is strong, and the waving grass grows long and rank in a moist soil, when fires occur of much more serious proportions. Then a great wall of flame, yards in height, rushes along, causing danger to travellers and destruction to all kinds of settlers' effects. I have been credibly informed that such fires find no difficulty in leaping such a river as the Assiniboine.

The grass on the prairies becomes, in the autumn, much drier and more combustible than it usually does in Europe; and, when it is remembered that the American climate is much drier than ours, that high winds are more prevalent, and that the area over which a fire can run, when once started, is of enormous extent, no one need wonder that very great conflagrations often take place. Nor is it difficult to see why such fires do not gain ground in civilised countries, such as England. The grass here is greener and much more succulent; it is generally fed-off so close that there is little or no dry inflammable portion left;

unbroken grassy levels of great extent are rare; the climate is moister; high winds are not so frequent; while the number of hedges and the large extent of cultivated ground would soon check any fire that once got started. Still, some idea of a prairie-fire on a small scale may be gained by watching the burning grass in summer on English railway embankments.

The spectacle presented by a large prairie fire at night is one of the most terrific sights imaginable. The lurid red glare from flames hidden below the horizon overspreads the entire sky, and gives to everything a most unearthly appearance; while, by day, the vast volumes of smoke, rising and blending with the clouds, are almost equally awe-inspiring. I have seen many such fires on my various visits to the prairies. As Prof. Hind says:—"The grandeur of the prairie on fire belongs to itself. It is like a volcano in full activity; you cannot imitate it, because it is impossible [elsewhere] to obtain these gigantic elements from which it derives its awful splendour."

Dr. C. A. White, of the Geological Survey of Iowa, has given us a graphic picture of the perils to which travellers on the prairies may be exposed from fire.† It is by a recognised man of science, and may therefore be relied upon more than the tales of uneducated settlers or imaginative novelists.

It being now understood how very prevalent these prairie fires are, the reader will, in a measure, be prepared for my statements as to the very powerful effect they have been able to exercise upon the face of the country in various ways.

First, let me take the matter of the blackness and fertility of the soil. That the soil is very black and very fertile has already been stated; and, with the knowledge already gained as to the prevalence of fires, it seems only like putting two and two together to make four, to conclude that these features are due to the fires. After a fire, the ash of the burnt grass is left as a black deposit upon the surface of the ground; and this is especially the case in the damp bottoms of "sloughs," and where the willows make the grass long and rank by shading the soil and keeping it moist. Such spots, at a little distance, appear, when burned, much blacker than the rest of the prairie, and examination shows the deposit of ash to be sometimes as much as one-eighth of an inch in thickness. Now it is a matter of common observation that the black prairie loam is usually blackest in such situations, and I do not think it is at all difficult for any well-trained mind, capable of weighing the effect of a very small cause very often repeated, readily to comprehend that the blackness, fineness, and fertility of the soil of the prairies is the effect, in a very large measure at least, of the annual deposition, for many generations past, of a very small quantity of this grass ash,

* 'Exploring Expeditions,' vol. i. p. 330.

† 'American Naturalist,' vol. i. (1871) p. 69.

which must undoubtedly have great manurial value. In Minnesota and Manitoba, the thickness of the black loam varies from about one to three feet; but, taking the average at about eighteen inches, and the average annual deposition of ash at only one-thirty-second of an inch, we find that it would have taken just 576 years to deposit eighteen inches of soil by this means alone. But the ash would certainly rot further and become consolidated after deposition; therefore let us double our figures, and we get 1152 years as the time required for the formation of eighteen inches of black loam. Of course, in moist districts, where the grass grows long, the rate would be higher, and in dry districts lower. I am perfectly aware that the foregoing is a very vague, and largely a speculative, calculation, but it will serve to illustrate my point.

The belief as to the black loam having originated thus is far from original, as I met and conversed with many settlers and others on the prairies who fully supported it. If the blackness and fertility of the soil are not due to the fires, to what are these features due? I have heard it maintained that the gradual decay of the grass for generations past was the cause; but dead grass and leaves have decayed in many other places for generations without leaving, so far I have seen, a soil nearly so black as that of the prairies.* The opinion of Prof. Sheldon, of the Agricultural College, Downton, Wiltshire, is only another piece of evidence in favour of the fires, though he does not allude to them. He writes: "The soil of Manitoba is a purely vegetable loam, black as ink and full of organic matter, in some places many feet (?) thick resting on the alluvial drift of the Red and Assiniboine rivers."

The following analysis of the prairie soil is given on the authority of Prof. Baker Edwards, of Montreal:—

Moisture	4.6
Organic matter	11.8
Phosphate and carbonate of lime	31.4
Soluble alkaline salts, potash and soda	8.6
Insoluble silica and gravel	43.6
	<hr/> 100.0

Obviously the perpetual occurrence of prairie fires must have exercised a very powerful influence upon the flora and fauna of the prairie country. We will take the latter first.

It is a remarkable fact that, although many species of fresh-water mollusca inhabit almost every pond, lake, and stream on the prairies, not a single species (so far as I could discover) inhabits the bare open prairie in Manitoba, although I have given a good deal of attention to the molluscan fauna of that country during my various visits to it.†

* Prof. Arthur Winslow, State Geologist of Missouri, writes that he is in full accord with me as to the origin of the black soil. "I consider the fires," he says, "a cause of first importance."

† *Journal of Conchology*, vol. iv. (1885) pp. 339-351.

That this is not due to the cold of winter, is, I think, obvious. I am convinced that the prairie fires must again be put forward as the cause of this remarkable fact; for I was careful to observe that the fire burns the grass so completely down to the ground that, had any molluscs been sheltering among its roots (as they habitually do in England), they would certainly have been burned. Not unfrequently, in dry parts of the prairie, the settlers cut hay round the ponds which collect in the depressions, afterwards setting light to the rushes to make the grass more succulent next year. In many such cases I noticed, where the pond had been dried up by drought, leaving the molluscs lying on the hard mud, that the flames, in burning the rushes, had burned and calcined the shells so thoroughly that their occupants would certainly have been killed had they not been already dead through the effect of drought. There are, however, a few small species of land-snails inhabiting the extensive spruce-swamps and the wet moss beside the "sloughs."

Further, there are, I believe, at the present time, very few species of mammal habitually frequenting the open prairie, *except burrowing ones*. An exception to this has to be made on account of one or more species of hare; but these in most parts of the prairie are rare, though common in the woods. In times past, of course, the buffalo and the antelope formed other exceptions. The prairie wolf, or coyote (*Canis latrans*) is essentially an inhabitant of the scrub, though it is often driven to seek its food on the open prairie in winter. These facts may, I believe, be most easily explained by supposing that the fires, by constantly sweeping over the prairies, have rendered them largely uninhabitable, except by burrowing animals.

To the same cause may, I believe, be attributed (at least in a large degree) a still more remarkable circumstance, namely, the entire absence of earthworms from the prairies of the North-west. I have been assured of this absence by many settlers, and have verified it by my own observation. Having elsewhere treated more fully of the subject,* I will but briefly refer to it here. Every one is acquainted with Darwin's interesting work, in which he shows that over the larger portion of the earth's surface we are in no slight measure benefited by the actions of these humble creatures. They are, in fact, nature's agriculturists, which, for generations past, have regularly ploughed and rendered the soil fertile in their own way. But, as there are no earthworms in the North-west, it is certain that the exceptional fineness and fertility of the soil of that country cannot be due to their action; consequently this enormous area of many million square miles must be regarded as forming an exception to the general rule shown to exist by Darwin. This absence of earthworms is rendered all the more noticeable by Darwin's remark that "earthworms are found in all

* 'Nature,' Jan. 3, 1884, p. 213.

parts of the world, and some of the genera have an enormous range. They inhabit the most isolated islands," &c.; and, further, that "worms throw up plenty of castings in the United States."

I do not know of any cause which can satisfactorily account for the absence of worms from the prairies, except fire, which, by burning the grass over large areas, would annually deprive the worms of that variety of decaying vegetable matter which constitutes their food. Frost, the only other possible cause, seems inadmissible, since worms occur in Iceland, hundreds of miles to the north.

It appears, therefore, as if the cause which has deprived the soil of the prairies of that natural cultivation by means of worms, which the soils of most other countries enjoy, has, at the same time, liberally supplied it with a manure resulting from the ashes of the grass which is annually burned.

We come now to the consideration of my assertion:—That the fires, by gradually killing and consuming the forests, have caused the treelessness of the prairies; or, in other words, that the prairies themselves are, largely at least, due to fire. The evidence on this point is, I think, very clear. It can be shown, I think, on the clearest evidence, that, if the fires have not caused the prairies, they are at least now extending them in numberless places; that trees still grow on the prairies on spots that are to some extent protected from the fires; and that, over large portions of the prairies, young trees spring up annually, only to be at once burned; but, if protected from the fire, they would grow and in due time reproduce the banished forest-growth.

In considering these assertions, it is first necessary to show that there is nothing in the physical or chemical constitution of the soil of the prairies which prohibits the growth of trees; or, in other words, that trees, if introduced, will flourish in the prairie soil. Obviously, if it could be shown that trees were unable (from any cause, known or unknown) to exist in the soil of the prairies, and, therefore, that they had never existed there, it would be futile to contend (as I do) that the trees which formerly flourished have been destroyed by fire, while the same agency prevents others from replacing them.

I am not aware that any one seriously denies that trees may be readily grown upon the prairies, if planted and properly tended. It is true that in Minnesota, Dakota, Manitoba, and other newly-settled districts, many settlers have planted poplar, maple, or other trees round their houses as "wind-breaks," and generally with the very worst success. But, in a country where the winds are so strong, trees, if planted at all on the open prairie, need some protection at first, such as being planted in clumps, or, still better, raised from seed in plantations. That they will grow from seed in the soil of the prairies is certain, and at High Bluff, about 45 miles west of Winnipeg, I saw several thick clumps of flourishing young maples that had been thus raised and protected from fire.

The fact that, in most (if not all) of the more northerly prairie States, and in Manitoba, Tree Culture Acts are in force and have been perfectly successful in every case where sufficient inducements have been held out to encourage the planting of trees by settlers, and where sufficient time has been allowed, is proof positive that there is nothing in the soil of the prairies inimical to the growth of trees, if only they are planted and properly protected at first.

In the Province of Manitoba there is a Tree Culture Act, which was passed in 1883. Under the provisions of this Act, the Lieutenant-Governor annually, by proclamation, appoints a public holiday, known as "Arbor Day," for the sole purpose of tree-planting. "All municipal, religious, and school corporations are earnestly begged and recommended" to co-operate in this work, "which promises in the near future important results." In 1887, I happened to be in Winnipeg on "Arbor Day," which was the 10th of May. As a holiday, the day was well observed, but I did not see many trees planted.

Those who have occasion nowadays to cross those portions of Iowa and Southern Minnesota where, fifteen years ago, there existed nothing but a treeless and uninhabited prairie, will see numerous clusters of flourishing aspens, while every settler's house has a few trees planted around it for the sake of shelter from the high winds of the prairies. Again, along each side of the Northern Pacific Railroad, at least as far west as the Missouri, young aspens have been planted as snow-breaks wherever there is a danger of the line being blocked by drifting snow in winter. In years to come these will provide an inexpensive substitute for the wooden snow-breaks at present in use.

Clearly, therefore, it is demonstrated, beyond the slightest possibility of doubt, that trees can flourish in the soil of the prairies. In fact, one might almost as well discuss the point whether fishes can or cannot thrive in water! But, further than this, it is a matter of every-day observation on the prairies that on any piece of ground over which the fire is prevented from passing (as, for instance, that inside a settler's fire-guard), a flourishing growth of willows, roses, silver-leaf bushes, and poplars, at once shows itself. If a portion of the prairie escapes the fire for one year, the growth of bushes has time to attain a height of (say) one or two feet; but, by keeping the ground moist, they encourage the growth of long grass, and thus bring about more surely their own destruction, for, when the relentless fire comes, it catches the grass and burns the young shoots of the bushes along with it; but there is no reason whatever why the poplars, at least, should not grow into trees, if they were protected from the fire.

One man, who had round his house several clusters of well-grown young poplars, told me that he had observed them springing up ten years before, and had preserved them solely by means of a fire-guard. In confirmation of what is here advanced, I may mention the case of a very

intelligent Ontarian gentleman, now farming on the bare, treeless prairie, about five miles north of Brandon, Manitoba. On first taking up his land, he was assured by his neighbours that it was unreasonable to suppose he would ever get trees to grow on his farm, for had the soil been suitable to them, they would certainly have been there. But he was too acute to believe this, and observing in the spring of 1883 a number of young seedling poplars springing up in a slight depression where the soil was more moist than on the level ground, he protected them by a fire-guard. The result of this was, that when I saw them in the following September, they were a flourishing lot of young trees some two feet high, which he hoped soon to be able to transplant. These trees must have originated from wind-blown seeds, as there were, I believe, no other trees whatever within three or four miles at least; and the gentleman in question had to go eight or nine miles for his supply of winter firewood.

In support of this, I will again quote Prof. Hind, who says: "In the State of Missouri, forests have sprung up with wonderful rapidity on the prairies, as the country became settled so as to resist and subdue the encroachment of the annual prairie fires from the west." Again he says†: "If willows and aspens were permitted to grow over the prairies, they would soon be converted into humid tracts, on which vegetable matter would accumulate, and a soil adapted to forest trees be formed. If a portion of the prairie escapes the fire for two or three years, the result is seen in the growth of willows and aspens, first in patches, then in large areas, which in a short time become united and cover the country, thus retarding evaporation and permitting the accumulation of vegetable matter in the soil. A fire comes, destroys the young forest-growth, and establishes a prairie once more. The reclamation of immense areas is not beyond human power; the extension of the prairies is evidently due to fires, and fires are caused by Indians."

My friend, Mr. Ernest E. Thompson, of Toronto, who is very familiar with the prairies of the Canadian North-west, says, in an article on *Prairie Fires*.‡ "If a piece of prairie, almost anywhere, be protected for two consecutive years, it will be found covered with a growth of poplars and willows; therefore I conclude that, but for the fires, the whole country would be covered with bush."

Dr. C. A. White says,§ "Without the least hesitation, the real cause of the present existence of the prairies in Iowa is the prevalence of annual fires. If these had been prevented fifty years ago, Iowa would now be a timbered instead of a prairie State."

In 'Scribner's Statistical Atlas of the United States' (1883, p. xxiii.),

* 'Red River and Assiniboine Exploring Expeditions,' vol. II. p. 377.

† *Ibid.*, vol. I. p. 357.

‡ 'Report of the Manitoban Department of Agriculture for 1883,' p. 191.

§ 'Geology of Iowa,' vol. I. p. 133; vide 'American Naturalist,' vol. xii. (1878) p. 93.

is the following passage:—"The prairie region is fast disappearing. The advent of civilised man upon the scene has had the effect of turning the scale in favour of arborescent vegetation. The cultivation of the soil of this level region increases its capacity for retaining moisture; forest and prairie fires have ceased; and, further, thousands upon thousands of acres of trees have been planted. The result is that the eastern part of what was, fifty years ago, a prairie region would scarcely be recognised as such to-day."

The facts, now clearly demonstrated, that not only can trees thrive in the soil of the prairies, but that they are incessantly striving to do so, and would succeed but for the fires, seem to me sufficient refutation of most of the views which have been brought forward by various writers to account for the treelessness of the prairies, as quoted in the commencement of this paper. In most of these, the fundamental contention is that there is something in the climate or in the physical or chemical constitution of the soil which prevents the growth of trees; but these views are, I feel certain, erroneous.

In connection with my statement that almost everywhere upon the prairies—even many miles from any other trees—a growth of young poplars and willows is always endeavouring to spring up, it is interesting to consider whence come the seeds of these young trees. It seems not improbable (though I cannot adduce evidence) that the level lands which are now prairie were once covered by a coniferous forest-growth, but the nature and very slow growth of coniferous trees would render their extermination very speedy under the constant recurrence of fires. As a result, we now find that by far the commonest trees are the poplars, chiefly the aspen (*Populus tremuloides*), the balsam poplar (*P. balsamifera*), and the cottonwood (*P. monilifera*), and various species of willow. These trees have great vitality in their roots, and repeatedly send up fresh shoots after the annual fires, until death from exhaustion ensues. Their downy seeds, too, are readily carried for long distances by means of the wind, and may lie dormant in the soil for years. That these seeds are thus distributed over long distances by the wind may be readily seen by any one who happens to be on the prairies during the few days in the spring when they happen to ripen. On this point I make the following verbatim extract from my note-book:—

"May 27th, 1887, Winnipeg, Manitoba.—No one who has been here during the last few days, which have been bright and fine, need wonder any longer how it is that, wherever the fire is prevented from running, young poplars at once spring up upon the prairie, even in places far removed from any other trees. During the last day or two, the air has been full of poplar-down, drifting slowly in the breeze, settling on one's clothes, tickling one's face, and catching in cobwebs wherever these are found. Probably the down comes from some considerable distance."

From all this it is clear that the prairies would quickly become covered with timber trees, were it not for the frequent fires.

Evidence as to the past and present destruction of forests, and consequent extension of the prairie through fire, is not less conclusive. An old half-breed in Manitoba told an intimate friend of mine that when, as a boy, he used to hunt the buffalo on what is now known as the Big Plain, it was covered with bluffs of good timber, which have now almost entirely disappeared. Many settlers can point to some dead tree or small clump of bushes which forms the last remnant of a respectable-sized "bluff" that has been destroyed by the fire within the last year or two. A settler always likes, where possible, to be able to shelter his house from the icy blasts of winter behind some small bluff; but if he wishes to preserve his shelter, it is imperatively necessary to surround it with a fire-guard. There is hardly a bluff that does not show signs of the fierce conflict it annually has to wage with the merciless fire.

A typical case is something of this kind:—A fire comes over the prairie, and, arriving at the edge of a "bluff" (as isolated clumps of trees are always called in Manitoba), or at the edge of the more extensive "bush," it attacks the outer trees, burning one side of their trunks just above the ground, also leaping up and consuming their smaller branches. Thus, perhaps, over an area of several acres, the fire has eaten into the bush as far as there was any grass to carry it, consuming the underwood, injuring (if not killing) the trees, but still leaving them standing. Next year the fire comes again from the same direction. If any young underwood has sprung up, it is again destroyed, and the fire enlarges the hollow in the trunks of the standing trees that it commenced the year before. This, if it does not prostrate them, effectually destroys their vitality; while the fire proceeds on still farther into the bush, destroying as it goes. The year after, the hungry fire comes again—nearly always from the same direction. Again the undergrowth is destroyed; again the hollows in the tree-trunks just above the ground are enlarged; again some of the trees fall and lie charred and half-burned as the fire passes on, again adding a larger area to that over which it has already spread hideous disfigurement. Those trees which were first attacked, and which have not already fallen, have now great black hollows scooped out of their trunks, as if some animal had gnawed into their bases till nothing but a shell remained to support them. But the fire seldom forgets to return year by year. When it does come, it gnaws again at the same spot where it has already several times found food for its unappeasable appetite; the trees fall, and the fire, passing on in its haste to attack those it has as yet only partially overcome, leaves them as charred and blackened logs upon the ground. Year by year the fire comes; seizes on these logs; chars them more and more completely, and rushes on farther and farther into the bluff, as the

destruction of the trees on the margin allows the grass to grow further and further in; until, in a few years, it is all destroyed. Twenty or thirty acres of wood are often thus destroyed in, say, seven or eight years. Will any one imagine the trees will grow again in the same period? The bluff may have been growing there for centuries, or possibly it may have been destroyed in like manner many years before and have grown up again; but, as growth is slow, and destruction by fire is swift, it is evident that, although some of the destroyed bluffs do grow again, on the whole the prairies would be extended. And with such havoc as I have described going on year by year, who can wonder at it? I have sketched no fancy picture, but one which I have seen in all stages of completion in the bluffs round Carberry and elsewhere in Manitoba. It does not seem to me reasonable for any man who has seen the destructive effect of these fires to deny that sufficient time only is wanted for exactly the same means to have originated even the wide prairies themselves.

Over and over again Prof. Hind speaks of having observed the same thing—forests of large pines, spruces, or tamaracs, prostrated by the fire, to be partially succeeded by a less valuable growth of elm, poplar, or willow, which, in its turn, is at last destroyed. Here is what he says upon the subject: *—"That forests once covered a vast area in Rupert's Land [an old name for the Hudson's Bay Company's territories], there is no reason to doubt. Not only do the traditions of the natives refer to former forests, but the remains of many still exist as detached groves in secluded valleys, or on the crests of hills, or in the form of blackened, prostrated trunks, covered with rich grass, and sometimes with vegetable mould or drifted sand. The agent which has caused the destruction of the forest which once covered many parts of the prairies is undoubtedly fire; and the same swift and effectual destroyer prevents the young growth from acquiring dimensions, which would enable it to check their annual progress. Nearly everywhere, with the exception of the treeless, arid prairie west of the Souris, and west of Long Lake on the north side of the Qu'Appelle, young willows and aspens were showing themselves in 1858, where fire had not been in the previous year. South of the Assiniboine and Qu'Appelle, few plains had escaped the conflagration in 1857, and the blackened shoots of willow were visible as bushes, clumps, or wide-spreading thickets, where the fire had passed."

Again, he says: †—"The annual extension of the prairies from this cause [fire] is very remarkable. The limits of the wooded country are becoming less year by year; and, from the almost universal prevalence of small aspen woods, it appears that in former times the wooded country extended beyond the Qu'Appelle, for three or four degrees of latitude south of its present limit. . . . This lamentable destruction of forests is

* 'Exploring Expeditions,' vol. ii. p. 376.

† Loc. cit., vol. i. p. 405.

a great drawback to the country, and a serious obstacle to its future progress." The same facts must strike every observant traveller on the prairies.

Prof. Macoun, of the Geological Survey of Canada, has frequently expressed his firm belief in the opinions I have here advanced, and many statements in support of these views may be found in his interesting work, 'Manitoba and the Great North-West,' where he states (pp. 27, 28) that between the Rocky Mountains and an imaginary straight line connecting Moose Mountain and the Touchwood Hills, the whole country is utterly devoid of wood as far north as lat. 52°, with the exception of Wood Mountain, the Cypress Hills, and certain narrow river-valleys. He also says (p. 104): "The real cause of the absence of wood on every part of the region under consideration is undoubtedly prairie fires, which sweep over every part of it year after year, destroying the seedling trees as long as there are any seeds left to germinate, and year by year killing the bushes, till the capacity of the root to send up shoots dies out, and then even willows cease to grow."

Elsewhere, in reference to Prof. Hind's journey of exploration, Prof. Macoun significantly adds that "where he [in 1857] saw large forests, I passed over in 1880 and never saw a twig."

Dr. G. M. Dawson, of the Geological Survey of Canada, says of the prairies of the Peace river (which, however, are hardly true prairies) that "there can be no doubt that they have been produced and are maintained by fires. The country is naturally a wooded one, and, where fires have not run for a few years, young trees begin rapidly to spring up . . . and it is probable that, before the country was inhabited by Indians, it was everywhere densely forest-clad."

Mr. Frank M. Chapman has made an interesting observation upon the prairies around Corpus Christi, Texas, where the arborescent vegetation has largely appeared during the last twenty years, and is yearly becoming denser and more extensive. This he understands is due to the introduction of cattle, which by grazing down the grass have prevented the fire from "running" and thus destroying the tree-growth."

Mr. Arthur Winslow, State Geologist of Missouri, makes a very similar observation on the prairies of Western Arkansas, which he regards as "due to a combination of causes: namely, the alternation from extremely cold wet soil during the rainy season to a hard dry soil in the dry season, and, further, the periodic recurrence of prairie fires." These prairies, however, have lost, or are fast losing, their treeless character, because, as they have now become "great open ranges for cattle, the grass is kept short, and there are no longer such fierce periodic conflagrations."† These observations show, in a remarkable degree, the baneful influence the fires must formerly have exercised,

* Bull. Am. Mus. Nat. Hist., vol. iii. (1891) p. 316.

† Bull. Geol. Soc. of Amer., vol. ii. (1891) p. 240.

for the grazing of cattle usually has the effect of preventing tree-growth.

The following extract from Dr. Asa Gray's paper on "The Characteristics of the North American Fauna," read before the Biological Section of the British Association at Montreal, on August 29th, 1884, is much to the point. He says:—"The prairies of the Atlantic States bordering the Mississippi and the Winnipeg country, shade off into the drier and gradually more saline plains, which, with an even and gradual rise, attain an elevation of 5000 or more where they abut against the Rocky Mountains. Until these are reached (over a space from the Alleghenies westward for about 20 degrees of longitude) the plains are unbroken. To a moderate distance beyond the Mississippi, the country must have been in the main naturally wooded. There is rainfall enough for forests on these actual prairies. Trees grow fairly well when planted; they are coming up spontaneously under present opportunities; and there is reason for thinking that all the prairies east of the Mississippi, and of the Missouri, up to Minnesota (and Manitoba) have either been greatly extended, or were even made treeless under Indian occupation and annual burnings. . . . The drier and barer plains beyond, clothed with the short buffalo grasses, probably never bore trees in their present state, except, as now, some cottonwoods (i.e. poplars) on the margins of the long rivers which traverse them in their course from the Rocky Mountains to the Mississippi. Westward the plains grow more and more saline; and wormwoods and Chenopodiaceae of various sorts, form the dominant vegetation."

Prof. A. R. C. Selwyn, Director of the Geological Survey of Canada, writes:—"Whatever the effect may be of these destructive conflagrations, in reference to the water-supply of the region, there is no doubt that . . . hundreds of miles of forest have thus been converted into wide and almost treeless expanses of prairie." Dr. R. Bell, the Assistant-Director, in forwarding a report to Prof. Selwyn shortly after says:—"Your remarks upon the destruction of forests by fire between Red River and the Rocky Mountains are corroborated by all that I could hear upon the subject. The rapidity with which some tracts between Prairie Portage and Fort Ellice were stated to have been converted from forest to prairie, is almost incredible."

Could anything show more conclusively than the foregoing statements the destruction which these fires have wrought?

It may, however, be asked, What has become of the trunks and stumps of these destroyed trees? The former, lying upon the surface of the ground, would be annually attacked by the fire, and at last would be entirely converted into ash, or they would be speedily disintegrated, when once well rotted, by a species of ants which drives tunnels through such soft logs in all directions. Dr. Bell, in speaking of the district

* 'Nature,' Jan. 15, 1885.

north of Fort Ellice, writes:—"The aspens of that region burn much more readily than does the wood of the same tree in Ontario and Quebec, and the portions which escape total destruction by fire rot and disappear in the course of one or two years."

My friend, Mr. Ernest E. Thompson, of Toronto, writes: "Far out on the open plains, sticks may be picked up and charred wood unearthed, showing where once were trees."

I have also heard of charred logs being dug up from below the surface of the open prairie. They had probably been covered by the burrowings of gophers and badgers. The working of these animals will also, to some extent, account for the disappearance of the roots and stumps of the trees; but it certainly is surprising that these should have disappeared so completely as they have done.

In discussing the destruction of the forests, we must take into consideration the fact that the fires, in nearly all cases, travel eastwards with the prevailing winds. In Manitoba, the mean resultant direction of the wind for eleven years (1871 to 1881 inclusive) was N. 44° W. This will help us to understand why trees, in the majority of cases, are upon the eastern side of a lake or river. Captain Butler remarks of the Red River:—"Its tributaries from the east flow through dense forests; those from the west, wind through the vast sandy wastes of the Dakota prairie, where trees are almost unknown."

Roughly speaking, the whole of the region for hundreds of miles to the east and north of Red River and Lakes Manitoba, Winnipegosis, Winnipeg, is one of dense forests, protected from the ravages of the prairie fires largely by those friendly pieces of water, while the whole region to the west is prairie, exposed to the fire.

Further, wherever there is an island in a lake, that island, being protected from the fire, is pretty certain to be covered with trees and bushes. Proofs of this may be seen everywhere on the prairies.†

* Report of the Manitoban Department of Agriculture for 1883, p. 491.

† The following information as to the distribution of forest and prairie in the State of Minnesota is extracted from the Introduction to the State Directory for 1884-5, and I think bears out what has been advanced above. "One-third of the State is covered by forests, and about one-sixth more by groves and wood-fringes. . . . In the counties of Cook, Lake, St. Louis, Itasca, Beltrami, Cass, Aitkin, Carlton, Pine, Kannebae, Mille Lacs, Morrison, Crow-Wing, Isanti, Chisago, and in parts of counties lying adjacent to these, there are forests of white pine of probably one-fourth of the entire area." In the forest districts, there are some small prairies from which the forests have been burned. "All the country west of the Mississippi and north of the Minnesota river, extending west into the counties of Sibley, McLeod, Meeker, Kandiyohi, Pope, Grant, Douglas, Otter-Tail, Becker, and, to a lesser extent, into Norman, Polk, Marshall, and Kittson, and also that south of the Minnesota river, including the whole or parts of the counties of Scott, Rice, Steele, Waseca, Le Sueur, and Blue-Earth, properly belongs to the forest district. The counties of Houston, Fillmore, Winona, Olmstead, Dodge, Wabasha, Goodhue, Dakota, Hennepin, Ramsey, and Washington, though belonging to the prairie region, have a large area of timber which fringes the borders of the Mississippi and its larger tributaries, sometimes extending back as far as ten miles and forming dense

Another fact, familiar to every one that knows the prairies, which may, perhaps, be brought forward in controversion of the foregoing, is that nearly all the streams crossing the prairies are fringed with a narrow belt of trees *on both sides*, eastern and western or northern and southern alike. This is the case, even on absolutely treeless prairies, on which grass will scarcely grow, and is, I think, largely due to the fact that the wind is unable to drive the fire down the sloping sheltered banks of the stream, as it does on the level prairie.

But water is not the only obstacle to the progress of prairie fires. A range of sand-hills answers much the same purpose. These sand-hills, though composed of fine and almost absolutely-pure, wind-blown sand, are usually sparsely covered with stunted timber trees, thus affording a paradox that, while vast tracts of abnormally-fertile soil are treeless, smaller tracts of great sterility are fairly-well timbered. The explanation, as given by Prof. Macoun,* seems to be that, whereas the fertile prairies produce an abundance of grass, which "carries" the fire to burn the trees, the sand-hills, through their extreme poverty, do not grow sufficient grass to carry fire, and thus the few trees growing upon them are safe.

These, then, are the grounds on which I base my contentions—that fire is the agency which has destroyed the forest-growth which once covered the prairies, and that, were the fires stopped once for all, trees in plenty would soon grow up in all parts. Had these fires been stopped some fifty years ago, it is not, I believe, too much to say that the whole of the true prairie region would now have been more or less thickly covered with light forests of deciduous trees, while the province of Manitoba, instead of being known as the "Prairie Province," would better have merited the title of the "Sylvan Province."

I do not deny that there are subsidiary causes. For instance, were it not for the exceptional dryness of the North American climate, the grass would seldom be in a condition to burn over large areas; again, if the surface of the prairies was uneven and much broken, instead of fairly level, very few fires would travel for long distances; while, were it not for the high winds which are prevalent on the open prairies, the fires would find it equally difficult to travel far. All these causes have no doubt had their effect; but I contend that all of them conjointly would

forests. There is also considerable timber along the Minnesota and Red rivers and about the lakes. Kittson, Marshall, Polk, Norman, Clay, Wilkin, Traverse, Grant, Stevens, Pope, Bigstone, Swift, Chippewa, Kandiyohi, Redville, McLeod, Sibley, and Nicollet, on the north side of the Minnesota river; Lac-qui-Parle, Yellow Medicine, Lincoln, Lyon, Redwood, Browne, Pipestone, Murray, Cottonwood, Watonwan, Rock, Nobles, Jackson, Martin, Freshorn, Faribault, Mower, Dakota, Goodhue, Wabasha, Olmstead, and Dodge, south of that river; and Ramsey and Washington, on the east side of the Mississippi, are properly prairie counties. All the others contain woodland enough to entitle them to rank as timbered regions."

* "Manitoba and the Great North-west," p. 105.

never have produced a prairie over an area which is naturally timbered were it not for the action of the fires.

If it be held that my view is untenable because in other continents, where fires have not prevailed, large areas of fertile soil also remain treeless, I answer that, although this may be the case, it does not by any means necessarily follow. The chief open grass-covered fertile regions of the world all occupy the central portions of large continents. They are as follows:—In North America, the prairies and the plains; in South America the pampas, the llanos, and the great grass-covered areas in the valley of the Amazon; in Asia, the steppes of Southern Siberia; and in Europe, the steppes of Southern Russia, which are to some extent a continuation of those of Asia. All these may or may not have had a different origin from the prairies, just as I believe the American plains are treeless from a cause different from that accounting for the openness of the prairies.

In this connection, I should allude to the *tchornozem*, or black earth, of Southern Russia, described by Sir Roderick Murchison in his 'Geology of Russia in Europe and the Ural Mountains' (vol. i. p. 557), and in the 'Journal of the Royal Agricultural Society' (vol. iii. p. 125). The black earth occupies an enormous region, extending from Hungary on the west, completely across southern Russia, and covering a very large area on the Siberian plains. It overlies all other kinds of soil, occurs at all elevations, and varies from 15 feet to 20 feet in thickness. It is "jet black when moist," is similar in nature throughout the entire area, and is so light and fine that travellers crossing it in a dry season are often thickly covered with a black dust, which rises up in clouds through the grass when disturbed by a horse's feet. The soil of the black earth region, like that of the prairies, is so excessively fertile that slovenly methods of farming are encouraged, and manure is allowed to accumulate in "hillocks of considerable magnitude." The foregoing description and the following analysis of it would serve almost equally well for the black soil either of Russia or Manitoba:—

Silica	69.8
Alumina	13.5
Lime	1.6
Oxide of iron	7.0
Organic matter	6.4
Traces of humic acid, chlorine, &c.	1.7
<hr/>	
100.0	

Sir Roderick Murchison is altogether opposed to the belief that the Russian black earth is "the humus arising from decayed forests or vegetables during the present period," though he admits this to be "the prevalent opinion in Russia." He regards it as a sub-aqueous deposit, probably derived from the denudation of the black Jurassic shale; but he does not deny that some speculation is needed in order to

account for the whole area covered on this hypothesis. He does not allude to the possible action of fire, but is "firmly persuaded that by no efforts could any Government produce forests in those districts except in certain rocky and moist spots." This may be quite true of the Russian steppes; but I am confident that the case is different with the prairies of America.

If the reasons I have adduced to account for the treelessness of the prairies cannot be safely applied to the whole of the prairie region in North America, then I urge that at least they apply fully to the northern portion of that area, with which I am most familiar.

Exploration in the Central Caucasus in 1890.

By DOUGLAS W. FRESHFIELD, HON. SEC. R.G.S.

Map and Panoramas, p. 140.

THE exploration and survey of the Central Caucasus progress steadily from year to year. The advance made in the last five years has been prodigious, and the time is now approaching—if it has not already arrived—when it will become expedient to arrange and summarise our knowledge. An essential preliminary to any such summary must be the formal division of the range for descriptive purposes into groups. In a chain, the glaciers of which are not broken for a space of 80 miles, which has no grass-pass between the Mamisson and the latitude of Sukhum Kaleh across its main ridge, such divisions must in places be more or less arbitrary. I shall, however, venture to suggest here those that seem to me most suitable, in the hope that they may meet with general acceptance. They are as follows:—

1. *Kasbek Group*. The range enclosed between the sources of the Terek and Ardon, not part of the watershed.
2. The main ridge from the Krestowaya Gora (Cross Pass) to the Mamisson Pass, which might be named the *Ardon Group*. Unlike the more western part of the main chain it is crossed by numerous horse-passes—a physical fact which accounts for Transcaucasian Ossetia.
3. The *Adai Khokh Group*, extending from the Mamisson to the Gebi-vsek, a glacier pass leading north from Gebi to Stir-Digoria on the Uruk.
4. The *Fastak Khokh* or *Rion Passes Group*, extending from the Gebi-vsek westwards to the Ciri-vsek, which leads from Balkar on the north to the Zeus-Skali sources.
5. The *Uindukh Group*, an unexplored cluster of granite peaks lying north of the watershed, between the Cherek and the Uruk.*
6. The *Central Group* from the Ciri-vsek to the Zanner Pass, including all the peaks between Balkar and Bezingi.
7. The *Tiktingen Group*, extending from the Zanner Pass to the pass at the western head of the Leksar or Gvalda Glacier, and including the great Suanetian glaciers.
8. The *Chegem Group*, north of the watershed between the Adyrtsu, Baksan, and the Cheghem torrent.

* A horse-track leads from Stir-Digoria to Balkar, over the northern spur of this range. It deserves the next traveller's notice.

9. The *Ushta-Dongusoran Group*, extending along the watershed to the Jiper Pass at the source of the Baksan.

10. The *Elbruz Group*, being the mountains between the sources of the Kuban and the Baksan.

11. The *Kador Group*, extending from the Jiper Pass to the Nachar Pass, the first proper horse-pass west of the Mamison.*

12. The *Isila-Shoda Group*, south of the watershed and enclosed between the sources of the Rion and the Ingur, and geologically connected with the Ardon Group.

The next step should be the preparation of a "Caucasian Guide," based on these divisions, for which the approaching completion of the new survey would afford a fitting opportunity. Few readers can have studied Caucasian literature without a sense that travellers have in some instances missed opportunities on the spot, in others diminished the value of their published observations, from not knowing beforehand as much as they might of their subject. Nor in the scattered condition of their predecessors' writings can such ignorance be fairly imputed to them as any serious blame. Again, some accepted nomenclature, some system of spelling, has become an urgent need. This is a matter in which no Caucasian traveller has been consistent, even with himself! The definite publication of the new survey will furnish a nomenclature to which, right or wrong, it will be expedient to bow. The system of transliteration suggested originally by this Society, and now adopted by the government departments of our own country and the Congress of the United States, will supply a standard of spelling. An authoritative Guide-book would probably assist in checking eccentricities—which index-makers at least cannot hold harmless eccentricities! I may perhaps venture here to express my opinion that it would be a serious blunder if in such a work brevity were made the first aim, if it were modelled on the tiny volumes of concentrated statistics—the Liebig's Extract of the traveller's library, as someone has called them—which Mr. Conway doles out dearly to the frequenters of the Kuffelhans. Those booklets may be the right thing in their own place; but the Handbook to a new country should be a readable volume, full of useful and general information, and not without local colour and even flavour of personal style; modelled, in short, on the fashion of the 'Alpine Guide' of Mr. John Ball, or of Ford's 'Spain.'

The third of the groups mentioned above, that named after its highest summit the *Ada Khokh† Group*, was the principal field of exploration in the Central Caucasus in the summer of 1890. This block of mountains and glaciers is situated 37 miles west of Kasbek and some 40 miles east of the Central Group‡ on the main chain at the spot where it ceases to be the watershed, and, as I have elsewhere pointed out, the orographic axis is rent by gorges, and the parallel limestone range becomes the division between the rivers of Georgia and Ciscaucasia, the tributaries of the Kur and the Terek. The upper valleys are parallel to the Caucasian chain or chains. The Rion and Ardon valleys are best represented by two T's, the Uruch by a Y, flattened. In the Kassara gorge the Ardon breaks clean through the granite axis. So gradual is the slope of its bed that though there is an ascent

* Horses are forced, but with peril, over the easiest of the passes leading from Soanetta to the Baksan and the Kuban. A track, intended for light artillery, has been made over the Nachar. But in 1889 most of the bridges on the south side had, after heavy rains, gone down to the Black Sea.

† The name *Adakom* is locally applied to the glen opening into the Kalther range at Saramag, on the upper Ardon, and appears to have been arbitrarily assigned to the group and its highest peak by the makers of the Five Verst Map.

‡ See 'Proc. R.G.S.' vol. x. N.S. p. 677; xl. p. 351; xli. p. 257.

of 7000 feet from the station of Alagyr to the top of the Mamisson there is only one zigzag on the road. The south side of the chain is far steeper.

The scenery of this portion of the range is very varied. The open basin of the Rion, filled by low broad green spurs, has many of the charms of Suannetia, though all on a smaller scale. Glorious forests, in which lofty smooth-stemmed beeches spread a green shade, broken only by the dark spires of gigantic pines—pines that are to those of the Alps what Salisbury steeple is to a village spire—clothe the river banks. Rolling downs, fringed with birch-groves and carpeted with flowers spread along the base of the frosty chain, itself a succession of bold snowpeaks and tumbling bays of ice. But there is no Ushba behind Gebi, and the southern summits of Adai Khokh are 2000 feet lower than the giants that overhang the sources of the Ingur. On the north side the valley of the Uruk, parallel to the main chain, is picturesque in comparison to the stern troughs up which the mists course, to wind round the feet of Dychtan and Koshstantan. The two great glaciers, the Karagom and Ceja, and under bristling rockpeaks and among luxuriant forests, in scenery of its kind unrivalled elsewhere in the Caucasus. The upper snowfields of the Karagom produce an overwhelming impression of vastness and purity different, but not inferior, to the effect of the towered mountain walls that confine within narrower limits the sources of the Bezingi Glacier. The Adai Khokh group has been called the Monte Rosa of the Caucasus, and in some details the comparison may hold good, but I should prefer to compare it to the Bernese Oberland—an Oberland with the points of the compass reversed, and its Aletsch Glacier a little below the "Place de la Concorde," careering suddenly over an icefall as high as that of the Ober Grindelwald Glacier!

A high-road leads over the first grass-pass across the Caucasus east of Elbruz, the Mamisson Pass (9352 feet), which forms the eastern boundary of the group. On the south the road descends the long valley of the Rion to Kutais. It affords a valuable direct connection between the Black Sea and Vladikavkaz—when it is open; but this is only for at most four months in the year and is likely to be for less, unless the local authorities have taken, or speedily take, measures to establish, as on the Alpine passes, gangs of labourers charged with the duty of keeping the road open, removing snowdrifts and earthfalls, and restoring bridges.

In variety and beauty of scenery the Mamisson is superior to the sometimes overpraised Dariel. The road is at first only a steppe track along the foot of the mountains, without bridges over the glacier streams descending from Kasbek and Gumaran Khokh, the peaks of which are in sight. It runs across a sea of wild flowers, amongst which, in July, the pale mauve hues of the mallows predominate, for two stages to Alagyr—a large Ossete village, where a numerous population nestles in wattled huts shaded by orchard trees, and half-hidden after midsummer by a luxuriant growth of sunflowers and other vegetables. I call the sunflower a vegetable, for its fruit is eaten in the Caucasus. A disused fort or blockhouse stands as an historical record of old times and troubles, and there is a good house where travellers with introductions to the local officers can take up their quarters.

At Alagyr a road in the western sense of the word begins. It immediately enters a limestone gorge, where the crags are fringed with ferns, and clothed in hanging woods of elm, lime, maple, oak, and alder. Beyond the valley widens, and the traveller sees about him the bare smooth-shaven green buttresses, dotted with grey human nests and broken by yellow scars which are characteristic of the schist zone of the northern Caucasus, which stretches between the outer limestone and the core of granite. Where the stream from the lead and silver mines of Sadon and the Kamunta Pass comes in (up to this point there are post stations), the granite mountains close in on the Ardon. Above the hamlet of Nuchal a number of forti-

fied caves are visible in a precipice overhanging the road and river. These were used for the defence of the upper valley in olden days. The country side is full of memorials of "old unhappy" but not "far off" things. A Russian bayonet often points a mountaineer's climbing-staff. A steady ascent leads to the Cossack station of St. Nikolai (4000 feet), shaded by walnuts and pinewoods, and situated opposite the mouth of the Ceja valley, and at the entrance of the great Kassara Gorge, where the Ardon pierces between walls of granite which rise 8000 to 8500 feet above its bed within a space of three miles on either side. Compared to the Dariel, the Kassara is longer and more romantic; less savage but more beautiful. Scattered firwoods—that recall Corsican rather than Alpine forests—add to the picturesque character of the broken tiers of porphyritic buttresses that spring up in noble lines towards the white peaks which shine between them and the glaciers which send down waterfalls amongst their hollows.

The upper vale of the Ardon, though surrounded by finely-shaped summits and studded with towered hamlets, is itself a bare grassy trench. Here, again, we are among the schists that lie on either flank of the granite. Despite constant views of Teja (14,510 feet)—liable to be mistaken for Gamaran Khokh—and of Chalaza (12,910), an isolated glacier-covered dome on the left, the traveller grows impatient for the pass.

On reaching the flowery crest of the Mamisson, a new and noble view breaks on his eyes. Close at hand, almost as close as the Eger is to the Wengern Alp, the southernmost peak of Adai Khokh rises to a height of over 14,000 feet; flowery downs spread round its base, glaciers pour precipitously from its flanks, in the distance the eyes rake the whole basin of the Rion to the Goribolo ridge, beyond which soars the icy crest of Shkura.* The descent to Oni (2750 feet), the humble capital of the Radaha, is through noble forest scenery enlivened by frequent glimpses of the snows, and the whole of the road to Kutais (a two days' drive along the Rion) is a succession of pleasing landscapes, of narrow ravines and fertile glades.†

For travellers as yet there are no conveniences; no postal service has been organised over the pass on the south side, no quarters are found beyond the humble roadside *duchans* used by the country folk. On the north side clean rooms may be had in the Cossack station at St. Nikolai. The only other resource is a tent, or a shake-down on the mud floor of the guesthouse in some Ossete village, or of the road-menders' houses near the pass. Olola (4600 feet), the first Mingrelian village—the hamlets above it are Ossete—may be used as a base for exploration of the great peaks from the south side. But Chiora, Gobi, or Oni, would furnish better supplies.

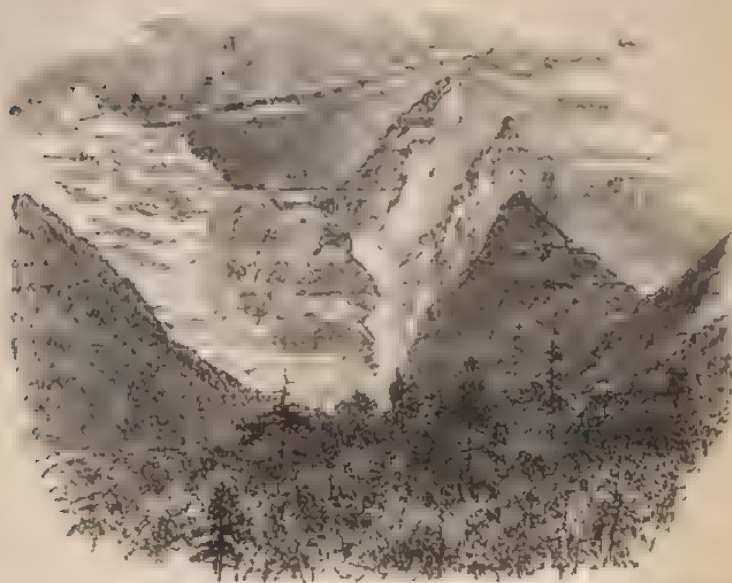
Russian travellers, or travellers in Russian employ, M. Dionik, Herr Radde, Dr. Abich, in early days visited the Mamisson and penetrated as far as the ends of the two great frozen streams which, issuing from far invisible and unknown fountains in the frozen recesses of the range, stretch their icy tongues down into the forest region. One of these, the Ceja Glacier, flows into a glen some ten miles long that opens on the Ardon valley at St. Nikolai. The glen has another attraction besides its glacier, the ancient shrine of Rekom, a place of pilgrimage from

* The view from the pasture-ridge (called by Abich Zitelli Mtn, and by Dionik Sateamp), which rises west of the source of the Khamkhaki, is still more beautiful. It is only an hour's walk from the Kaserna on the Khamkhaki Skali.

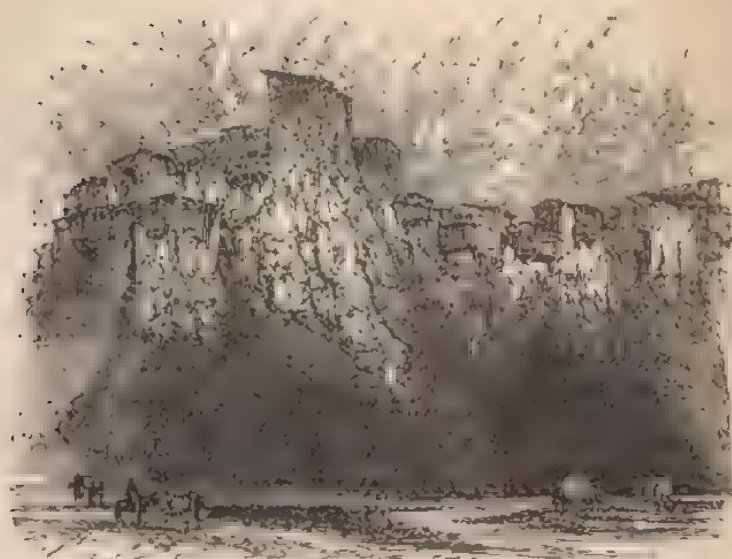
† It is a four days' drive from Vladikavkaz to Kutais, and may often take five. The accompanying woodcuts, taken from my old book 'The Central Caucasus,' may be of use in suggesting at a glance the distinctive features of the landscapes of the upper Ardon valley and the Rion sources.

No. 2.

No. 3.



THE VALLEY OF THE BUDI CHALI (SOUTH SIDE). D. W. F. del.



AN OSSETE VILLAGE (NORTH SIDE).

time immemorial for the country-side. The shrine is a low wooden building about the size and shape of an Alpine haybarn. The logs are unsmoothed, and the only external ornaments are some curious carvings on the projecting rafters of the roof. The interior is now ruinous, and contains nothing but a few sacred pictures in decay, and heaps of horns of the Caucasian ibex (*Capreolus Pallasii*). In old times many offerings were made by the devout, but it is said that after the Russian occupation any one used to be allowed to exchange new coins for old. At present the treasury is empty of either! The principal pilgrimage is in the month of August. The wood of which the chapel is built is locally stated to be a kind of pine that grows only on the other side of the chain in the Mingrelian uplands. Hence a legend has arisen that "once upon a time" there was a frequented pass where the Ceja Glacier now pours its frozen billows through the steep mountain-walls. The legend involves a physical impossibility, but is worth recording as a parallel to the Alpine legends of a similar nature which have been convincingly, and I should hope finally, demolished by Dr. Richter in his recent paper in the Transactions of the German and Austrian Alpine Club.*

In these remote valleys both we and Signor Sella fell upon a most unlooked-for class of fellow-travellers. In a tent at the foot of the Ceja Glacier we found an elderly Ossete come up to reside there for the air and milk-cure for several weeks. Sella met in the Skattkom valley several individuals living in the shepherd's *kech* with a similar object.† The virtue of mineral waters is also much appreciated in the Caucasus. Near Oni, a few miles down the Rion, there are springs frequented in summer by the country folk to the number—according to Dr. Radde—of from 600 to 1000 yearly. Probably in Roman times similar guests might have been found round the springs of St. Moritz.

While on the subject of Ossete antiquities, I may remind the antiquarian that it is in the neighbouring districts of Songuta and Digoria that the most extensive finds have been made of prehistoric and Byzantine objects in the primitive cemeteries. At Zenaga in Digoria, and again at Chegem, we met with Ossete monuments. They are small square edifices with convex curved roofs and ledges along the sides, on which trophies of the chase are laid as offerings. They thus resemble on a small scale, and with less ornament, the classical tombs of Asia Minor, and differ entirely in type from the elongated Tartar headstone found elsewhere on the north side of the Caucasus, on which the horse, arms, and accoutrements of the deceased (doubtless what at an earlier date was buried with him) are often depicted in low relief. The group of Ossete tombs at Chegem is particularly interesting as showing the former extension of the race which has since lost that valley and the Balkar district, and in the Digor district (the valley of the Uruk) been modified by intermarriage and conversion to the faith of the neighbouring Tartars of Balkar.‡

I return to topography. In 1868, when the three young Englishmen whose travels are recorded in my 'Central Caucasus' undertook to examine roughly *ambulando* the nature of the chain between Kasbek and Klbruz, the second object of their journey was this Adai Klok Group. Our information on it was limited to the excursions below the snow-level of Abach and Raide, and to a very vague and confused notice in Klaproth of the snow passes between Digoria and Gebi, the chief

* See "Gesch. d. Schwankungen d. Alpengletscher von E. Richter," 'Zeitschrift d. Deutschen u. Oesterreichischen Alpenvereins,' 1891, Bd. xxii.

† Compare the custom of the people of Badakshan of resorting to their highlands for health mentioned by Marco Polo.

‡ See M. Chantre's 'Recherches Ethnologiques au Caucase,' 1865-87.

village on the upper Rion.* Beyond the paths of men or the tracks of hunters all was obscure.

Our intention was to have gone up the Ceja valley and crossed from its head to the Mamisson. But the difficulties we had experienced with the inhabitants in traversing the deep and isolated basins that hold the eastern sources of the Ardon, made us give up a project which involved separation from our baggage. Consequently we carried out but half our plan and were content to cross the Mamisson to the south side. Thence we traversed one of the native glacier passes farther west, the Gurdzi-væk. On the northern side we found ourselves on a forested spur, comparable to the Montenvers, overlooking a vast glacier, more than comparable to the Mor de Glac, which from the very heart of the group poured due northwards towards the Uruk. Above us a great icefall fell in 4000 feet of shattered séracs from Nowhere, as far as existing maps went. Next day, after nine hours, six spent in the icefall, we had conquered it. We crossed, guided by the compass, a vast "shining tableland" of snow guarded by great rockpeaks, except to the south, where the watershed was, and the main chain ought to have been. At last, from an almost imperceptible "divide," we looked down on the blue forest distances of Mingrelia, and, after further difficulties caused by ignorance of the ground, got clear by nightfall of the snows.

We had thus gained a general idea—but only a general idea—of the character of the group. It was obvious that its chief feature was this gigantic névé of the Karagom Glacier; that this was ringed on the east side by a semicircle of lofty peaks, while to the west Barjula stood comparatively isolated. From the Rion basin we had seen two peaks, an Eiger-like summit overhanging the Mamisson, and a double snowpeak; we had seen two great rockpeaks over the Karagom icefall; what lay on the connecting ridge we had not seen. It had been masked from us as we traversed the névés by lower spurs.

The next explorer to enter on the snows was M. de Déchy in 1884; he took photographs, explored the Ceja Glacier and climbed a peak at the head of it, which he now thinks was one of the higher peaks, but at the time believed to be No. 6, the summit which both he and I had erroneously identified with the Adai Khokh of the Five Verst Map, the highest triangulated point in the group. In 'Petermann's Mitteilungen' (1889, Heft 9) M. de Déchy published a map on a large scale of the Ceja Glacier. His cartographer, with excellent intentions but unfortunate results, tried to extend it to the Karagom Glacier, using for the latter the Five Verst Map. Not unnaturally; for it is a hard thing to persuade cartographers that a Government survey may be worse than useless. The result was unsatisfactory. There was obviously "something wrong somewhere." Now I think we have found out, where!

From the Topographical Bureau at Tiflis (whose invariable courtesy to foreigners and readiness to communicate all scientific information relative to the Caucasus call for the warmest acknowledgment), I obtained the points from which the triangulation of the Adai Khokh of the Five Verst Map (made in the Fifties) was taken, and found that they were very distant points. Obviously General Chodzko and his surveyors had triangulated the highest point of the group from afar, and on nearer approach had wrongly identified the peaks and distorted their topography to fit a neighbouring summit. The Adai Khokh Group resembles in several respects the Oberland, the Karagom roughly corresponding to the Aletsch Glacier. What

* The best explanation that has been given of Klaproth's very curious description of the passage with horses of the Gebi Passes—the Gurdzi-væk and Gebi-væk or Godi-væk (new map)—is that he took down hearsay information and turned it into a narrative in the first person.

had happened was equivalent to the Finsteraarhorn having been triangulated from Bern, and the Schreckhorn or Eiger wrongly identified with it in filling in the topography. But the Finsteraarhorn of the Caucasus was still undiscovered.

It was not till 1887 that, half-way up Shoda, an isolated peak south of Gebi,* I saw once more the Adai Khokh Group, and looked over the watershed to the peaks that ring the Karagom Glacier. There, sure enough, was the peak I wanted, or rather two peaks, a rockpeak with two blunt heads, close behind the double snow-peak of the Riou, and farther back a long comb of snow and ice on which the sun's rays last rested. Clouds spoiled my panorama from the summit of Shoda, but this view had been enough to suggest a solution of the problem.

In 1889, before undertaking the search for traces of our lost friends, we gave our Swiss guides a training walk in the Adai Khokh Group. We forced the glacier pass I had planned in 1808, between the Ceja Valley and the Mamisson Pass. We left the half-ruined refuge on the south side of the Mamisson at 2 a.m., and knocked up the Cosacks at St. Nikolai at 9 p.m. The ascent from the south was easy, but four hours were spent in descending a very difficult rockwall, only 400 feet high, on to the Ceja snowfields. There was seldom foothold and handhold at the same time, and as all the grooves and hollows were a sheet of ice there was much of that interminable work known to climbers as step-cutting. However, here and there it was possible to find a perch. I succeeded in utilising such leisure moments in making rough outlines and notes of the aspect of the frosty peaks and ridges that encompassed us. At last by an ingenious test, namely heaving stones down the ice gullies, we discovered one which had enough snow in its centre to assist our descent. Down this, as on a ladder, we crept backwards, moving one at a time, and driving the staffs of our axes in to the head at every step. The Bergrutsch, or great moat below the wall, might have been impassable later in the season. As it was we had each in turn to take a flying leap into the feather-bed of fortunately soft snow that lay beneath it. It was a very pleasant drop for the light weights, but at least one climber imbedded himself so deeply that he had to be tenderly dug out like a precious newly-found Greek statue at Olympia, from the superincumbent material. Then we lunched luxuriously under the shadow and shelter of the overhanging upper lip of the snow trench. The icefall of the Ceja Glacier we did not, nor did Mr. Mummery in the following year, find formidable. It is liable, however, to become so. Our pass is seen in the illustration (from a photograph of M. de Döchy) to the 'Alpine Journal,' vol. xii. p. 217, immediately east of a rock-tower on the skyline. A more practicable passage may possibly be found a few hundred yards farther west.

I do not desire to dwell at any length on "mountaineering" details, always more or less monotonous. Enough to say that we emerged from the region of icefalls and moraines in time to enjoy the evening hours in the woods round the chapel of Rekom. Overhead shot up crags like the Engelhorn of Rosenlaui, but granite in place of limestone; a great glacier poured in a broad sheet from the right-hand mace. In the foreground was an almost trackless forest of beech, birch, and fir, with an undergrowth of laurels, golden azaleas, cream rhododendrons, and roses—not *Alpenrosen*, but single wild roses. That evening walk, the gleam of the white and blush roses under the forest trees, the faint delicate colours of the tall mahows and Canterbury bells in the open glades, the fragrance of the fading azaleas, will live as long as my memory lasts. From the cornfields of Cei we saw the sun

* See the descriptions of this remarkable village and its inhabitants in Grove's 'Frosty Caucasus,' and in S. Sella's paper in the *Bollettino* (1891) of the Italian Alpine Club.

set behind the double-headed peak (No. 4); we nearly missed the cart-track below the villages in the gloaming, and an hour after dark were being welcomed by the friendly Cossacks of St. Nikolai.

Clouds vexed us, as they have other travellers, in crossing the Kamunta Pass, and we felt bound not to put off the search we had set before us by lingering about the magnificent mountains of the Karagom. The next, and last, instructive view I had of the Adai Khokh peaks was from Donkin's bivouac on the rocks below the Donmala Pass. The peaks were seen hence in outline at a distance of 30 to 35 miles, and I summarised what I saw in the sketch-map issued in these 'Proceedings.' But this sketch, though since confirmed in essentials, was, to a certain extent, hypothetical and without detail. It was a means and not an end. Last year (in 1890) the end was attained. The orography of Adai Khokh was made clear, its highest peak and its finest belvedere, Adai Khokh itself and Burjula, were climbed, and the scenery was fully illustrated by the superb photographs of Signor V. Sella, now in the Society's collection.

I must briefly summarise the work done by mountaineers. Signor V. Sella has given in the *Bollettino* of the Italian Alpine Club a very clear and instructive account of his last year's expeditions and discoveries. He and his caravan descended from the Kamunta Pass (8000 feet) to the hamlet of Dunta in a bleak pastoral basin on the head-waters of a tributary of the Uruk. Here they ascertained that the Skatikom of the natives is the glen west of that so named on the Five Verat Map, which is locally known as Songuta. Its important glaciers remain unexplored. Like all its visitors, Sella was overwhelmed with admiration at the picturesque splendour of the scenery round the lower part of the Karagom Glacier, in the vicinity of which he camped for many days, and made several expeditions. He climbed the two summits, Sforza and Burjula, on either side of the Gurdzi-rack Pass; he obtained photographs revealing all the secrets of the Karagom névé. About the same time two Englishmen, Mr. Holder and Mr. Cockin, from a camp in the Rion basin, climbed Burjula by its southern and eastern faces, and after traversing the great snowfields reached, without difficulty, the triangulated peak of Adai Khokh.* They satisfied themselves of its predominance, and ascertained the existence of a curious twist in the watershed (see map), which allows the western slopes of Peaks 4 and 5 to drain towards the Rion. Clouds hindered more minute observations. Mr. Mummery had also, from the Ceja Valley, penetrated into the hitherto unexplored north-western névé-basin of the Ceja. He describes the gaps leading from it to the Karagom as steep but not inaccessible. Its relations to the Songuta glaciers demand further investigation.

Meantime those very energetic and competent officials, the surveyors and engravers of the Tiflis Topographical Bureau, had not been idle. They pushed up their new survey into the basin of the Ceja and all along the northern glaciers of the chain, reaching as far as the icefall of the Karagom; they measured numerous peaks and revised the nomenclature—a matter on which Signor Sella in places differs from them. In fact each village, sometimes each individual, has a separate nomenclature, and it is always a question which shall be adopted. On the whole, the final decision of the Government officials must as a matter of convenience, I think, be allowed to prevail, though until the survey is issued in a final form discussion may be profitable. There is no doubt that if the New Survey finally transposes Dychtau and Koshtantau foreigners must submit, though the inconvenience to western map-

* Since, as is now clearly shown, this peak does not overlook the true Skatikom valley, the name of Skatikom Khokh suggested for it (*Alp. Journ.*, vol. xiv.) must be withdrawn.

makers and geographers will be almost as great as is that to historians when a British statesman late in life takes a peerage.

Whatever credit is due to the accompanying map, to which these notes are an appendage, belongs in the first place to the Russian Staff. What I have done is to methodise the photographs, notes, and observations taken by mountaineers, and to add from them the ground south-west of Burjula and the details of the upper Karagom basin. The map has thus been rendered a tolerably exact and complete physical representation of the group. It also shows better than several pages of letterpress the character and direction of the mountaineering undertaken; how thoroughly the snowfields have been trodden in many directions. When shall we have a similar map of any single group, or portion of a group, in the Sikkim Himalaya?*

I shall not encumber these pages with a laboriously detailed statement of the topographical facts accumulated in the map. To decompose a map is a short way of making an article appear solid, much favoured by some writers, who apparently flatter themselves that what is clumsy and unreadable must be scientific. There are some points, however, in which a map may be aided by description.

There are marked on the new maps in this group, one peak over 15,000 feet, nine over 14,000, and five over 13,000 feet. The lowest pass in it falls just under 11,000 feet. About 65 square miles are covered with snow and ice. The Karagom Glacier is 10 miles, the Cujn Glacier 8 miles, and the Songuta Glacier $3\frac{1}{2}$ miles in length.

The relations and individual features of the cluster of summits collectively known as Adai Khokh, standing east of the Karagom névé and west of the Ceja and Songuta névés have at last, thanks to the Russian maps and Signor Sella's and Mr. Holder's photographs, been made clear. The range may be compared to a χ , of which the lower arms meet just above Peak 4, and the upper separate at a minor rocktooth between Peaks 2 and 3. No. 6 (14,023 feet) stands at the bottom of the eastern lower arm, and the watershed is formed by the lower arms, Adai Khokh itself lying well north of it.

I begin at the top western arm. My No. 1 (14,133 feet) is a double-headed rockpeak, its north face has been compared to the Meije in Dauphiné by S. Sella, its south face to the Breil aspect of the Matterhorn by myself. Its perpendicular cliffs, draped in hanging glaciers, form the most striking feature of the lower Karagom. This peak is well seen in the distance from the Stule-vsek.

No. 2 (14,600 feet), the next peak of any size on the crest, is generally of a retiring character. It may, however, be the peak noticed through a break in the mists by M. de Döchy from Kamunta.

No. 3, Adai Khokh (15,274 feet), shows from the south-west as a broad face of snow and rock. From a distance it resembles the final peak of the *Pointe des Écrins* but is much less formidable and less uplifted above the adjacent ridges.

No. 4 (14,874 feet). Next comes this bold double-fanged rockpeak. Its distinctive feature is the long white gully running up between its rockribs. From Shokh it suggests an expurgated Ushba. It is probably easy of access from the north.†

* While these pages are passing through the press I hear from M. Jukoff that in 1891 his colleague on the Survey, M. Kortomidze, has visited the snowfields of the Karagom and climbed several of the summits of Adai Khokh, finding Mr. Holder's card on one of them. The results of his labours have not yet been worked out.

† None of these summits are seen from the paths in the Bion valley. The two following, on the contrary, are frequent features in the landscape.

No. 5 (14,497 feet). A beautiful, broad, twin-crested snow-mountain, in the style of Piz Palu (in the Engadine). Its highest crest lies north of the point which from the Rion valley looks the loftiest. Separated by a deep narrow gap from No. 5 rises the rock-peak No. 6 (14,063 feet), overlooking the Mammison, the Eiger of the group, the Adai Khokh of my 'Central Caucasus,' and M. de Déchy. It has a singularly bold outline, and rising on the very edge of the comparatively low pastures, imposed more than it ought to have on us early explorers.

Outside the χ , to the east, a grand peak of 14,462 feet dominates the Kalther ridge south of the Ceja Glacier, while the crest that divides that basin from the slopes draining towards the Urukli is a row of splintered needles, such as those that separate Chamonix from the Mer de Glace—attaining in two of its pinnacles 14,239 feet and 14,081 feet.

Of the gaps between these peaks, that between 1 and 2 connects Karagom-Songuta, that between 3 and 4 Ceja-Karagom, and those between 4 and 5 and 6 the Ceja Glacier and the two southern glaciers descending towards Gloia.

This range of summits standing in line is as difficult to disentangle in many points of view as are the peaks above the Gerner Glacier. As with the Alpine group so with the Caucasian, one name was at first sufficient for the whole. Nos. 5 and 6 might perhaps be called Tusleas Mta and Khamkhaki Khokh respectively. Tusleas Mta (Mta, wrongly printed "Mt." in some copies of the map, = mountain in Georgian) was the name given to Radde for the range on this side.

My last words on Adai Khokh shall be of practical advice to any one who may be disposed to complete the work of exploration among these peaks. If he is a peak-hunter, Nos. 1, 4, and 5 will most attract him; if a paes-man, I have already indicated how much remains to be done. The explorer should pay special attention to the glaciers and peaks above Kamunta. The lover of scenery—and what intelligent person is not?—will on no account miss Rekom, the lower Karagom and its icefall, and the heights above Gurschavi and Gebi. I do not think competent ice-men need be afraid of the Karagom icefall; it looked to me easier on my last visit than when we passed it. But, of course, the condition of an icefall is subject to annual and even, as Mr. Woolley found on the Tutuin Glacier, to weekly variations.*

THE SURVEY OF SUANETIA.

It was not only in the Adai Khokh Group that knowledge was increased in 1890. Signor V. Sella went on across the forests of the Zenes Skali to Suanetia and photographed and explored its glaciers. Here, too, our kind friend and host in 1889,

* The following is, I believe, a fairly complete bibliography of the Adai Khokh district:—

- Abich, *Mein Vojage en Transcaucasien* en 1864, Moscow, 1865.
- Chantre, *Recherches Ethnologiques au Caucase*, Paris, 1885-87.
- Déchy, M. de, *Alpine Journal*, vol. xii. Nos. 88, 89, 92; *Petermann's Mittheilungen*, 1889, Heft 9.
- Dinnik, *Petermann's Mittheilungen*, vol. xxi. Heft 11.
- Fischer, A., *Zwei Kaukasus Reisen*, Bern, 1891.
- Freshfield, D. W., *Travels in the Central Caucasus*, London, 1869; *Illustrated Travels*, vol. ii. 1870; *Alpine Journal*, vol. xiv. No. 106; *Geographical Proceedings*, N.S. vols. xi. No. 11, xii. No. 5.
- Grove, F. C., *The Frosty Caucasus*, London, 1875.
- Holder, H. W., *Alpine Journal*, vol. xv. Nos. 110 and 114.
- Klaproth, *Travels in the Caucasus in 1807-8*, London, 1814.
- Radde, Dr., *Reisen im Mingrelischen Hochgebirge*, Tiflis, 1866.
- Sella, V., *Bollettino del Club Alp. Italiano*, vols. xxiii. and xxiv.

that enterprising surveyor, M. N. Jukoff, was at work; and the sheets already (thanks to the kind promptitude of General Shdanoff) forwarded to Western Europe, throw an extraordinary amount of certain light on the orography of the southern flanks of the great chain and its stupendous glaciers.

In the first volume of the 'Alpine Journal,' the late Mr. Adama-Reilly—a geographer whose work, had it lain in Central Africa instead of in Central Europe, might have been better appreciated—has told the story how a chance meeting at the Montenvers between Colonel—then Captain—Mieulet, of the French staff, and himself led to that officer being bitten with the mountain fever, and accompanying Reilly on one of his cartographic ascents. In the result the late Colonel Mieulet used his influence at headquarters to such good purpose that not only was a special map of Mont Blanc on an extraordinary scale authorised and issued by the Government, but also a complete change came over the spirit and method in which the snowy region of the French Alps was surveyed and delineated.

I would not arrogate any such share in Monsieur Jukoff and his colleagues' inspiration to their meetings with English mountaineers, but it is permissible to believe that the sympathy and appreciation of Mr. Doukin and others have been some encouragement in the labours needful for the production of the specimens of rapid and graphic mountain cartography that now lie before us.

In these maps conventional contour lines are used to express the slopes, and the copies forwarded are hand-coloured in the following manner:—Glaciers and snow, *blue*; forests, *green*; pastures, *yellow*; rocky ground, *brown*; villages, *red*. I extract from the maps the following figures relating to the heights of a few of the great peaks, and the length, area, and lowest level reached by some of the principal glaciers:—

Shkara (lower westernmost peak), 16,590 feet (the highest peak has been assigned 17,036 feet); Janga (two peaks), 16,669 and 16,527 feet; Kartantau, 16,296 feet; Gestola, 15,932 feet; Tetnuld, 15,918 feet; Tiktingen, 15,267 feet; Tashil Tau, at head of Thuber Glacier, 13,685 feet; Ushba, north peak, 15,405 feet; south peak, 15,408 feet; Dongusoran, north peak, 14,533 feet; central peak, 14,603 feet; south peak, 14,546 feet.

M. Jukoff writes:—"These heights are determined trigonometrically by means of one of the best theodolites, measurements having been made from seven or eight different spots of the first class (fundamental) trigonometrical network, and none of the observations differ by more than seven-tenths of a foot. I should say that such measurements were ideally good."

It will be remembered that it is only a few years since there were said to be few or no glaciers in the main chain of the Caucasus. The following statistics as to a portion (that as yet mapped) of the Suanetan icefields are, therefore, not without interest:—

Beginning at the east, the Ushkul Glaciers are not yet mapped. The Kalds Glaciers have a length of $4\frac{1}{2}$ miles, and end at 7057 feet above the sea. The Adish Glacier has the same length, and ends at 7388 feet. The great Zanner Glacier has a length of nearly seven miles, and, including its tributary from Tetnuld, covers an area of almost exactly 20 square miles; it ends at 6829 feet. The Thuber Glacier, with its affluents, covers 17.3 square miles, is $5\frac{1}{2}$ miles long, and ends at 6664 feet. The Loksur (my Gvalda Glacier) with its affluents covers 18.2 square miles, is eight miles long (or nine from end to end of its upper trough, which lies parallel to the main chain), and ends at 5691 feet. The very steep Salaam Glacier pouring down from Ushba descends to 5180 feet, the lowest level reached by ice in the Caucasus. It is seen like a silver staircase from the Latpari Pass with Elbruz just visible beyond, but is hidden from the lower ridges of Suanetia. The western glaciers of

Ukha and the great icefield round Dongusorun, and the smaller but considerable glaciers west of the Nakra Valley and on the Lella, are not yet mapped. But we shall hardly be far wrong in setting down 100 square miles of ice and snow as the amount drained by the Ingur alone.

I am glad to be able to append to these notes some extracts from a paper read by M. Jukoff before the Geographical Society at Tiflis, which show the energy and intelligence with which, encouraged by the appreciation of the Scientific Societies of Europe, the survey of the Caucasus is now carried on.

GLACIER SURVEYS.

"During the last four years I have been engaged in surveys in North Caucasus; namely, in the Balkar, Khulan, Bezingi, and Chegem communes of the monntaineers, all belonging to the Naltchik district of the province of Terck. I have spent there no less than four months every summer.

"The region is remarkable for its glaciers. The chief of them is the Ulu-chiran (Ulu, great; Chiran, glacier) or Bezingi Glacier, which is the largest glacier in the Caucasus. Its length is about 17 versts (11·4 miles), if measured on the eastern branch which takes its origin in the Dych ridge, while its width varies from 580 to 1170 yards. I did not see myself all the glaciers of the Caucasus, but I doubt whether there is another to surpass it in beauty and dimensions. Its lower extremity descends to 6538 feet, and the ice at its end attains a thickness of 214 feet.

"Next comes the Mishirgi-chiran, formed by two branches, which, after joining together, make a *mer de glace* about four miles long; while its entire length measured upon the eastern branch, which takes its origin under Koshtantau—the Dychtau of English literature and the Five Verat Map—attains six miles. Its width varies from 420 to 930 yards, the middle part only being narrowed to 375 yards. Its lowest extremity is 7422 feet over the sea, and the ice has there a thickness of 425 feet. The two glaciers, Ulu-chiran and Mishirgi, give origin to the Cherek Shkara river.

"A third glacier, Ulu-uz, flows from the eastern side of Koshtantau (English Dychtau). Its length is about 7 versts (4·7 miles) and its width is over 700 yards. The Ulu-uz is one of the most accessible glaciers; its side-moraine can be reached on horseback. The Dumala, a tributary of the Cherek, flows from beneath its lower extremity situated at a level of 8085 feet over the sea, the thickness of ice at its end being 287 feet.

"More glaciers, only second in size to the above-named, are met with in the same neighbourhood—those of Ukiu and Salman-chiran deserving a special mention. Their beauty and the wild scenery of the surrounding mountains are a special attraction for travellers.

"Last year (1889), by the end of June,* when I was working on the survey, I erected little stone walls at the very extremities of the three first-named glaciers, in order to measure, however approximately, their decrease in the course of the summer. True, that the end of June was rather late for this purpose, because the thawing of the glaciers had already begun; but as the chief amount of thawing takes place in the second part of July, the error still could not be very great.

"I revisited the glaciers the same year in the middle of October, and I found the following results:—The extremity of the Ulu-uz glacier had retreated by but 8 feet from my wall; for the Ulu-chiran the retreat of the extremity of the glacier attained 60 feet, and 56 feet for the Mishirgi. It is worthy of notice that, according to the

* All dates in new style.

measurements of M. Dinnik, this last glacier advanced by nearly 465 yards during the years 1880 and 1881.

"As I knew that next year I should be again in the same neighbourhood, I erected fresh walls, and besides I traced two lines across both the Ulu-chiran and the Mishirgi, in order to measure the rapidity of the motion of both glaciers. The one line was traced close to the extremity of each glacier, and the other higher up. Each line consisted of five *sours* (wicket enclosures filled with stones): one was placed on each of the two old side-moraines, one on each flank of the glacier, and one in its middle. I had to stay at the beginning of this year's summer (1890) near the sources of the Cheghem river, and could only pay another visit to the glaciers in the first part of September. It was quite the right time, because frosts had already set in, putting an end to further thawing, and I was enabled to determine with exactitude both the yearly retreat of the glaciers due to thawing, and the amount of their motion during the year. However, it must be remarked that the summer of 1890 was exceptionally hot. It appeared that the Mishirgi Glacier had been shortened by thawing by full 73 feet, and the Ulu-chiran by 77 feet. I found, further, that the old side-moraines which I had supposed to consist of gravel and sand, owing to their being thickly clothed with grass and bushes, were disintegrated and shortened a good deal. It appeared that the gravel and the sand were but a thin coating, while the bulk of the moraines consisted of hard and clean ice.

"It resulted from my measurements that the yearly motion of the Mishirgi Glacier was 52 feet, and that of the Ulu-chiran 56 feet, at the lowest extremities of the two glaciers, where the declivity is greatest. The other two lines, traced higher up, gave a yearly motion of 42 feet for the Mishirgi and 49 feet for the Ulu-chiran. Both sets of figures refer to the marks placed in the middle of each glacier; as to those which stood on the borders, their motion evidently was slower, so that I could see myself an illustration of the theory according to which a glacier flows like a river; that is, more rapidly in its middle and slower towards its banks."

"Of course, my observations during the last two years can give no definite results. A longer period of, say, ten years would be required. Unhappily, I am but a casual observer of glaciers, and have no possibility of regularly pursuing the same studies.

"I must also say that a visible change took place during the hot summer on the slopes of the main chain. Whole slopes, covered with snow during the preceding year, now had their rocks entirely bare; the snow had rolled down in the shape of avalanches, covering the glaciers and, at some places, rendering them quite impracticable.

"In June last (1890), my work was in the main chain, at the sources of the Cheghem, so that it included the two gorges, Bashil-su and Gara-su, which give origin to the Cheghem river by their junction. The survey of the Gara-su (Sour Water), better known to the inhabitants under the name of Gara-*aux* (Sour Glen), entered into my programme. The name of the gorge is due to an iron spring in its upper part which is denominated by Tiktengen the chief peak (15,133 feet) of this part of the main chain.

"A narrow and rocky ridge shoots off from this peak, dividing the upper part of the valley into two branches: the right branch contains a glacier, named Kulak by the Tartars, and Sghumar by the Suanetes; and the left branch has a glacier

* The reader must take care not to confuse the figures relating to the rate of motion of the ice, and the oscillations of its snout.—D. W. F.

the Tartar name of which is Shaurtu (Skulan with the Suanetes). The last glen joins another glen, Tinturgu, containing a glacier of the same name. It originates in three sources, which flow from the Kara-shih-tau, and has a length of but three and a half versts (2·3 miles). Its lowest extremity is 9704 feet.

"The Shaurtu Glacier has a length of 4·7 miles; it flows throughout its length parallel to the main chain, and is fed by its snow. Its average width is about 580 yards, but it increases in its upper part where the glacier divides into two branches. Its lowest extremity is 7291 feet over the sea."

"The Kulak Glacier—the finest of the three—also flows parallel to the main chain in a rather narrow gorge. Its end-moraine leans against a little ridge, clothed with a pine forest, which is also an old moraine—very old in fact, as indicated by the size of the trees growing upon it. The glacier is rather narrow in its upper part (255 yards), but it widens lower down. Its lower part flows over a very steep bed, and is so thickly covered with a mass of boulders that one hardly might suspect the presence of a glacier were it not for the crevasses which intersect it in all directions.

"At about half its length, a rocky prominence called Kara-tube (Black Hill) divides it into two high icefalls; but further down it advances with a gentle gradient, and its surface is quite free of stones. Almost under the main chain it turns to the right into a valley parallel to it, flows over two steep cascades, which follow one another on a distance of less than a mile, and approaches the pass.

"It is very easy to observe the yearly progress of the Kulak Glacier. A mass of stones fall upon it every year from the icefall to the right of the Kara-tube rock, and these stones are transported further down by the ice; so that, on standing upon the Kara-tube and looking downwards, one sees on the glacier several dozen of parallel rows of stones having the shape of arcs whose convex sides are turned in the sense of the motion of the ice. They afford a very nice illustration of the greater rapidity of motion of ice in the middle part of the glacier.

ATTEMPT ON SHKARA.†

"Of all the above-mentioned peaks I only tried the ascent of Shkara (17,036 feet), which seems to be one of the most accessible. I was not simply tempted by curiosity, or driven by the enthusiasm of the alpine climber, which takes possession of every one in that enchanted world of mountains, when I undertook this rather hazardous ascent. I also had a topographical purpose; namely, to measure the height of that giant peak with greater accuracy, a result best obtained by observations repeated on the top of the mountain. But I failed in my attempt from causes independent of my own will. I could find no guides; even an offer of fifteen roubles a day did not tempt any one to accompany me up the Ulu-churan, even as far as the Dych Pass. All those to whom I made the proposal refused it, as they never had been that way. Besides, the Cossacks whom I had with me, all born in the lower valleys, could not bear the rarefied mountain air. Already, at a

* This glacier was explored by the search party in 1889, who crossed the ridge dividing it from the Salinan Churan meeting with M. Jukoff near its foot.

† This account may help to put a stop to an assumption often made in the discussion of any distant mountaineering, that the natives of the mountains are "mountaineers" themselves, or capable of judging what is feasible for "mountaineers" in the exact sense of the word. Wordsworth's peasant neighbours gave the true meaning to "mountainner" when they denied the title to the poet because he kept for the most part to beaten paths. The sum offered by M. Jukoff (15 roubles a day) sounds fabulous to us English climbers—who yet have been accused of paying extravagantly!—[D. W. F.]

height of 9000 feet, they suffered from asthma and pains in the head, while at higher levels some of them fainted, and bled from the nose. Later on, they supported better the air of the mountains, but they never got quite accustomed to it.

"On August 30th, after many unsuccessful attempts at finding a guide, I decided to go without, with my Cossacks only, and to reach, at least, the Dych Pass. At three o'clock in the morning our party, consisting of eight Cossacks and myself, left the encampment which was situated that night about five miles higher than the end of the Ulu-chiran Glacier. It was quite dark, and when we reached the foot of the main chain, where the glacier turns towards the pass, we took a rest, waiting till daylight came, as it would be dangerous to go over that part of the glacier in the dark. We started again about five. The Cossack who led the march was attached with a native leather rope passed around his waist, and all of us kept to the other end of the rope. More than once the leader of our file fell into some crevasse concealed by the snow; and after each such adventure we had to decide which of us should take the lead, because a Cossack who had once fallen into a crevasse positively refused to continue to march first. However, the glacier was dangerous for less than one mile and a half; further on, the crevasses were few, and we advanced with better heart. Close under the pass we met again with some difficulties in crossing two icefalls; but with all that we reached the top of the pass, 12,726, about nine o'clock.

"After having taken some rest, I went with one Cossack to reconnoitre the ridge, which we now had to follow in order to reach the summit of Shkara. It appeared that there would be no difficulty in so doing. The weather was excellent, warm, calm, and absolutely cloudless. In short, all was in our favour. Of the eight Cossacks, I left three on the pass, as they were unable to go further. But as soon as we started, I at once realised that the spirit of the men was such as to render it impossible to achieve our aim. The avalanches which were falling on all sides, and sometimes covered us with snow-dust, frightened them. They began to make frequent halts and to talk about leaving the topographical instruments behind, so as to be able to walk more rapidly.

"After a four hours' march we reached a first summit, 14,904 feet; but the real summit of the mountain was very far yet (over 2000 feet higher). The view from our summit was really majestic. In the north we had the steep walls of the two giant peaks, Dych-tau and Koshtan-tau. In the east the Dych Glacier took its origin from beneath our feet, and streamed between the main chain and the Koshtan ridge. In size it is not much behind the Ulu-chiran. In the distance we had a panorama of the main chain, headed by Kasbek; and in the west we saw the Ulu-chiran, surrounded by the peaks Janga-tau, Katyn-tau, and Giestola. Further distant we distinguished other summits of the main chain, the farthest seen being Elbruz.

"Here I was compelled to abandon the idea of reaching the top of Shkara. The hour was growing late, and the Cossacks were very tired with carrying the instruments; while, without instruments, the ascent had no purpose. After a two hours' rest we went back, and reached our encampment late in the evening.

"On September 3rd, about five o'clock in the afternoon, when I was following the right moraine of the Ulu-chiran Glacier, I noticed a great number of small birds of prey flying over the glacier. It struck me, as I had never before seen anything of the kind. The explanation was at hand when we left the moraine and came over the glacier, as we saw numbers of quails shooting from beneath our feet, and immediately captured by the birds of prey. Next day, early in the morning, I went from our encampment straight to the glacier, and could see how far the ornithologists are wrong in maintaining that during their migration the birds never cross the chain of the Caucasus, but follow the sea-coast. Besides the quails, I also saw a

few doves and several *Oriolus galbula*. One of the latter was caught by one of the Cossacks; it was so cold that it could not fly. Farther on we found a big flock of ducks and other aquatic birds rising from a little pond by the lateral moraine. As we approached the main chain we found more and more corpses and skeletons of various species of birds scattered over the glacier, while at the very foot of the chain the surface of the ice looked like a battle-field; corpses and skeletons were seen in all directions. I stayed by this glacier till the 13th of September, and every day I saw numbers of various birds. They were most numerous in foggy weather."

Orthography of Geographical Names.

THE following revised and somewhat amplified statement of the system of orthography for the native names of places, devised by the Council of the Society in 1885,* has been recently circulated among all to whom it is likely to prove of service:—

1, SAVILE ROW, BURLINGTON GARDENS, W.

December 11th, 1891.

In 1885 the Council of the R.G.S., impressed with the necessity of endeavouring to reduce the confusion existing in British maps with regard to the spelling of geographical names, in consequence of the variety of systems of orthography used by travellers and others to represent the sound of native place-names in different parts of the world, formally adopted the general principle which had been long used by many, and the recognition of which had been steadily gaining ground, viz. that in writing geographical native names vowels should have their Italian significance and consonants that which they have in the English language.

This broad principle required elucidation in its details, and a system based upon it was consequently drawn up with the intention of representing the principal syllabic sounds.

It will be evident to all who consider the subject, that to ensure a fairly correct pronunciation of geographical names by an English-speaking person an arbitrary system of orthography is a necessity. It is hardly too much to say that in the English language every possible combination of letters has more than one possible pronunciation. A strange word, or name, even in our own language is frequently mispronounced. How much more with words of languages utterly unknown to the reader.

The same necessity does not arise in most Continental languages. In them a definite combination of letters indicates a definite sound, and each nation consequently has spelt foreign words in accordance with the orthographic rules of its own language.

It was therefore not anticipated that foreign nations would effect

* 'Proceedings,' 1885, p. 535.

any change in the form of orthography used in their maps, and the needs of the English-speaking communities were alone considered.

The object aimed at was to provide a system which should be simple enough for any educated person to master with the minimum of trouble, and which at the same time would afford an approximation to the sound of a place-name such as a native might recognise. No attempt was made to represent the numberless delicate inflexions of sound and tone which belong to every language, often to different dialects of the same language. For it was felt not only that such a task would be impossible, but that an attempt to provide for such niceties would defeat the object.

The adoption by others of the system thus settled has been more general than the Council ventured to hope.

The charts and maps issued by the Admiralty and War Office have been, since 1885, compiled and extensively revised in accordance with it. The Foreign and Colonial Offices have accepted it, and the latter has communicated with the Colonies requesting them to carry it out in respect to names of native origin.

Even more important, however, than these adhesions is the recent action of the Government of the United States of America, which, after an exhaustive inquiry, has adopted a system in close conformity with that of the R.G.S., and has directed that the spelling of all names in their vast territories should, in cases where the orthography is at present doubtful, be settled authoritatively by a Committee appointed for the purpose.

The two great English-speaking nations are thus working in harmony.

Contrary to expectation, but highly satisfactory, is the news that France and Germany have both formulated systems of orthography for foreign words, which in many details agree with the English system.

The Council of the R.G.S., by printing the Rules in 'Hints to Travellers,' and by other means, have endeavoured to ensure that all travellers connected with the Society should be made aware of them; but as it is possible that some bodies and persons interested in the question may still be in ignorance of their existence and general acceptance, they feel that the time has come to again publish them as widely as possible, and to take every means in their power to aid the progress of the reform.

To this end, and with a view to still closer uniformity in geographical nomenclature in revisions of editions of published maps—a gigantic task requiring many years to carry out—the Council have decided to take steps to commence tentatively indexes of a few regions, in which the place-names will be recorded in the accepted form.

M. E. GRANT DUFF,

President.

RULES.

The Rules referred to are as follows:—

1. No change is made in the orthography of foreign names in countries which use Roman letters: thus Spanish, Portuguese, Dutch, &c., names will be spelt as by the respective nations.

2. Neither is change made in the spelling of such names in languages which are not written in Roman character as have become by long usage familiar to English readers: thus Calcutta, Cutch, Celebes, Mecca, &c., will be retained in their present form.

3. The true sound of the word as locally pronounced will be taken as the basis of the spelling.

4. An approximation, however, to the sound is alone aimed at. A system which would attempt to represent the more delicate inflexions of sound and accent would be so complicated as only to defeat itself. Those who desire a more accurate pronunciation of the written name must learn it on the spot by a study of local accent and peculiarities.

5. The broad features of the system are:—

(a) That vowels are pronounced as in Italian and consonants as in English.

(b) Every letter is pronounced, and no redundant letters are introduced. When two vowels come together, each one is sounded, though the result, when spoken quickly, is sometimes scarcely to be distinguished from a single sound, as in *ai, au, ei*.

(c) One accent only is used, the acute, to denote the syllable on which stress is laid. This is very important, as the sounds of many names are entirely altered by the misplacement of this "stress."

6. Indian names are accepted as spelt in Hunter's Gazetteer of India, 1881.

The following amplification of these rules explains their application.

Letters.	Pronunciation and Remarks.	Examples.
a	<i>a</i> h, <i>a</i> as in <i>father</i>	Java, Banaia, Somali, Bari.
e	<i>eh</i> , <i>e</i> as in <i>file</i>	Tel-el-Kebir, Oldfeh, Yezo, Medina, Levika, Peru.
i	English <i>e</i> ; <i>i</i> as in <i>virgin</i> ; the sound of <i>ee</i> in <i>beet</i> . Thus, not <i>Feejee</i> , but	Fiji, Hindi
o	<i>ows</i> in <i>mole</i>	Tokyo.
u	long <i>u</i> as in <i>flute</i> ; the sound of <i>oo</i> in <i>boot</i> , <i>oo</i> or <i>ou</i> should never be employed for this sound. Thus, not <i>Zooloo</i> , but	Zulu, Sumatra.
	<i>Al. vowels are shortened in sound by doubling the following consonant</i>	Yarra, Tanna, Mecca, Jidda, Bouny.*

* The *y* is retained as a terminal in this word under Rule 2 above. The word is given as a familiar example of the alteration in sound caused by the second consonant.

Letters.	Pronunciation and Remarks.	Examples.
	Doubling of a vowel is only necessary where there is a distinct repetition of the single sound.	Nunúia, Oosúma.
ai	English <i>i</i> as in <i>ice</i>	Shanghai.
au	as in <i>how</i> Thus, not <i>Foochoo</i> , but	Fuchau.
aw	is slightly different from above	Maeno.
ei	as in <i>air</i> .	
	is the sound of the two Italian vowels, but is frequently slurred over, when it is scarcely to be distinguished from <i>ey</i> in the English <i>they</i> .	Beirut, Beid.
h	English <i>h</i> .	
o	is always soft, but is so nearly the sound of <i>s</i> that it should be seldom used.	Colébo.
	If <i>o</i> were not already recognised it would be written <i>Seibes</i> .	
ch	is always soft as in <i>church</i>	Chingchin.
d	English <i>d</i> .	
f	English <i>f</i> . <i>ph</i> should not be used for the sound of <i>f</i> .	
	Thus, not <i>Haiphong</i> , but	Haifong, Nafa.
g	is always hard. (Soft <i>g</i> is given by <i>j</i>)	Galapagos.
h	is always pronounced when inserted.	
hw	as in <i>what</i> ; better rendered by <i>hu</i> than by <i>wh</i> , or <i>h</i> followed by a vowel, thus <i>Huany ho</i> , not <i>Wang ho</i> , or <i>Hwang ho</i> .	Hwang ho, Ngan hwi.
j	English <i>j</i> . <i>ij</i> should never be put for this sound ..	Japan, Jinchuen.
k	English <i>k</i> . It should always be put for the hard <i>c</i> .	
	Thus, not <i>Cora</i> , but	Korea.
kh	The Oriental guttural	Khan.
gh	is another guttural, as in the Turkish	Dagh, Ghazi.
i		
m	As in English.	
u		
ng	has two separate sounds, the one hard as in the English word <i>finger</i> , the other as in <i>anger</i> . As these two sounds are rarely employed in the same locality, no attempt is made to distinguish between them.	
p	As in English.	
ph	As in <i>loophole</i>	Cheonulpho, Mokp'.
th	stands both for its sound in <i>thing</i> , and as in <i>this</i> . The former is most common.	Bethlehem.
q	should never be employed; <i>qu</i> (in <i>quiver</i>) is given as <i>kw</i> . When <i>q</i> has the sound of <i>k</i> as in <i>quot</i> , it should be given by <i>k</i> .	Kwaugtung.
r		
s		
sh		
t	As in English.	
v		
w		
x		
y	is always a consonant, as in <i>yard</i> , and therefore should never be used as a terminal, <i>i</i> or <i>e</i> being substituted as the sound may require.	Sawakin.
	Thus, not <i>Mikindany</i> , but	Kikuyu.
	not <i>Awaiy</i> , but	Mokindani.
z	English <i>s</i>	Kwale.
zh	The French <i>f</i> , or as <i>s</i> in <i>treasure</i>	Zulu.
	Accents should not generally be used, but where there is a very decided emphatic syllable or stress, which affects the sound of the word, it should be marked by an acute accent.	Muzhlaho.
		Togutabn, Galapagos,
		Palawan, Sarawak.

GEOGRAPHICAL NOTES.

The Society's February Meetings.—At the Evening Meeting of February 8th Captain F. E. Younghusband will read a paper on his recent journeys in the Pamirs and neighbouring countries.—On February 22nd Mr. Theodore Bent will give the Society an account of his researches in the ruined cities of Mashonaland. The many objects of art and handiwork belonging to the ancient inhabitants of these strange buildings, which Mr. Bent found by excavation in and about the ruins, will be on exhibition the same evening, after the reading of the paper.

Mr. Bent's Expedition to Zimbabwe.—Mr. Theodore Bent, to whom reference is made in the previous note, has returned to England. His expedition has been most successful, and the discoveries he has made will help in a large degree to solve the problem of the origin of the buildings known as Zimbabwe—a name signifying "royal residence." Besides the principal Zimbabwe, on the borders of Manica, Mr. Bent has examined a number of other ruins, all having the same name. On the Sabi river he found four sets of ruins nearly equal to the circular building at Zimbabwe. Another little ruined fortress of best Zimbabwe work was found on the Mazoe. Other discoveries and observations were made, all bearing on the main question of the origin of the ruins. Mr. Bent has accumulated a vast mass of material, and that relating to Zimbabwe is now assuming a very definite form. Mr. Bent states that the nature of the ruins is closely akin to Arabian. He is inclined to believe in the Sabean origin of the ruins. Mr. Bent stayed at Lisbon on his way home to make researches. As he will give us the result of his explorations at the meeting of February 22nd, we shall not have long to wait for details. Mr. Bent is bringing home a very considerable collection of material, which, with other objects contributed by Mr. Cecil Rhodes, Mr. E. A. Maund and others, he intends to exhibit in London. As is stated in the previous note these collections will be first shown at the Evening Meeting at which Mr. Bent will give an account of his discoveries.

The Island of Ukerewe, Victoria Nyanza.—The Right Rev. A. R. Tucker, Bishop of Eastern Equatorial Africa, sends us the following account of a visit recently made to the Island of Ukerewe by the Rev. J. V. Dermott:—"Starting from Nasa on April 1st (1891) at 4 a.m., we reached Kitaro Island about 9 a.m. There is evidence on the rocks here of a subsidence of the lake of five or six feet. The people are very simple, living in straw huts of the poorest description, cultivating sufficient land to provide themselves with corn, bananas, potatoes, and matogo, besides hording a few cattle. Two days later we reached Ukerewe, and next morning went overland to the capital, about 10 miles. We were unable to pass through the Lugeshi Straits in the

beat, as in parts there are only a few inches of water. The chief or sultan, whose name is Lukenge (the same who had Shergold Smith and O'Neill killed fourteen years ago), had heard of our arrival. The capital consists of a cluster of from fifty to a hundred villages." Bishop Tucker is on his way to pay a second visit to Uganda, travelling through the Masai country.

Deep-Sea Explorations in the Eastern Mediterranean.—The deep-sea explorations in the Eastern parts of the Mediterranean, which were continued this year by the Austrian Government, on board the *Pola*, were rich in interesting results; they are analysed by Prof. J. Luksch in the *Sitzungsberichte* of the Vienna Academy (vol. 100, 2nd division), and were briefly referred to in the 'Proceedings' for December. Leaving the Adriatic at Cape Leuca, the *Pola* proceeded south to the latitude of Navarino; thence she ran south-east, to Candia, visiting also Cerigo Island and Santorin. Sailing round the eastern part of Candia, the *Pola* proceeded to Alexandria, west along the African coast to Ras Milhe, thence to Candia again, along the south-western coast of that island, to Cerigo, Milo, and the Pyraus. The soundings during this cruise were extremely interesting, inasmuch as in latitude $35^{\circ} 44' 20''$ and longitude $21^{\circ} 44' 50''$ (about 50 nautical miles south-west from Cape Matapan) the *Pola* found the depth of 4400 metres (2406 fathoms), followed within a few miles further east by a depth of 4680 metres (2536 fathoms), which are the greatest depths recorded in the Mediterranean. They have received from the Austrian Hydrographical Board the name of Pola Deep. The great depression of the Mediterranean must thus be shifted considerably east from its former central position on our maps. Another deep area was explored between Candia and Alexandria—the depths 'attaining from 3310 metres (1810 fathoms) some 20 miles south-east of Grande Bay, and from 2392 metres (1298 fathoms) to 2120 metres (1322 fathoms) within a short distance from Alexandria; the maximum depth sounded being 3008 metres (1678 fathoms) in $28^{\circ} 39' 50''$ north latitude, and $33^{\circ} 19' 54''$ east longitude. The full results of the numerous and varied observations made on board the *Pola* will be published when all calculations have been completed; but several interesting facts are already indicated in the preliminary report. The highest temperatures were found in the first parts of the voyage, and are given as follows:—From $80^{\circ} 8'$ F. to 69° in the first 50 metres (27 fathoms); from 69° to $62^{\circ} 5'$ in depths from 50 to 100 metres (27 to 55 fathoms); from 59° to 57° in depths of from 200 metres (110 to 547 fathoms) to 3000 metres (1640 fathoms). The lowest temperature ($52\frac{1}{2}^{\circ}$) was observed at the issue from the Adriatic Sea, at a depth of 760 metres (415 fathoms); at 4400 metres (2406 fathoms) the temperature was 56° . It was observed last year that in the Central Mediterranean the density of the water and its saturation with salt increased with depth, and the same was observed in the western part of

this year's cruise. But in the Eastern Mediterranean the density of water varies but very little in the different strata (from 1·0297 to 1·0300), and it is higher on the whole than in the West. The transparency of the water is very great in the Eastern Mediterranean; in three cases a white disc was seen down to a depth of 54 metres (177 feet), but it disappeared from view at a depth of 32 metres (105 feet) at the above-mentioned station in the south-west of Cape Matapan. Many data relative to the colour and transparency of water in connection with the weather were collected, and they will be analysed in subsequent reports. On the whole, no less than 50 deep-sea soundings were made—27 soundings reaching depths of more than 1000 metres (547 fathoms). Prof. Luksch's paper is accompanied by a map.

Exploration in the Black Sea.—On December 16th Captain Spindler read before the Russian Geographical Society a paper on his deep-sea explorations in the Black Sea during last summer. They were made, in May, on board the war-sloop *Donets*, and in July, on board another war sloop, the *Zaporozhets*, to complete the explorations of the previous year, and to verify more closely the interesting results of that year's researches.* In May, the soundings were carried on in the north-western parts of the Black Sea, and along lines crossing the sea from Sebastopol to Sinope, to Constantinople, and to Varna. In July, they were made partly along the same lines, and partly in the south-east and along the coasts of Anatolia and Caucasia. No less than 128 soundings, of which 58 were at great depths, were made during these two cruises, and at each spot the temperature, the density, and the salinity of the water were measured. Samples of water taken from depths above 100 fathoms were chemically analysed. The time between these two cruises was given to the exploration of the Sea of Azov on board the schooner *Kazbek*. The soundings made in 1891 fully confirmed the results arrived at in 1890. The 100 fathoms' line lies close to the shores of both the Crimea and Anatolia, and the axis of the greatest depression has a direction from south-west to north-east. The steepest coast was found at Rizo, situated between Batum and Trebizond, where the angle of inclination attains 10°. The water of the Black Sea begins to be warmed by the air in May, and in August its temperature is higher than that of the atmosphere. The variations of temperature at the surface lie between 77° and 43° to 41° Fahr., while on the northern shore it is sometimes cooled down to 32° Fahr. Below a depth of 200 fathoms the temperature is invariably 48°, this high temperature being due entirely to the deep current of warmer and saltier water which flows from the Mediterranean through the Bosphorus, as fully appears from this year's soundings. The annual variations of temperature due to the seasons do not penetrate deeper than 100 fathoms; this depth may also be taken as the average inferior limit of organic life, the deeper strata

* See 'Proceedings,' 1890, p. 171.

of water being infected with sulphuretted hydrogen. As to the Sea of Azov, which has no depth more than eight fathoms, its water is so thoroughly mixed by each gale, that no difference could be detected between the temperatures and densities at the surface and at the bottom. The observations upon currents fully confirmed the existence of a circular current which flows from the Crimea to the north-west, and then south in the western part of the sea. As to the flora and fauna of the Black Sea, Captain Spindler is of opinion that his observations fully confirm the opinion current among many Russian explorers, namely, that formerly it was a closed basin, which had a fresh-water fauna; but that since the Bosphorus was pierced, and gave access to salt water, this latter took possession of the greater depths, and compelled the former fresh-water fauna to migrate to the mouths of the rivers. But further biological exploration is required—this one fact being, however, quite certain, viz., that below the 100 fathoms' layer there is no organic life, because the water is so much impregnated with sulphuretted hydrogen.

The New Trade Route between Persia and India.—In connection with the efforts made about a year ago by Sir R. Sandeman* to open up the trade route between Persia and India by way of Baluchistan and Seistan, it is interesting to see from Consul-General Maclean's recent report on the trade of Khorassan and Seistan that a caravan came to the last-named place from Quetta in 1890-91 with loads of piece goods, indigo, and other miscellaneous articles, and returned to Quetta laden with *ghi* (clarified butter), green pulso, and other products. The people of the caravan stated that during the previous winter they had carried about 400 loads of *ghi* from Seistan to Quetta. A Persian trader, with a large batch of horses and mules, had also recently started for Quetta by the Seistan route. Our Consul-General at Meshed says it is generally believed that the route has a great future in store for it, for by it a camel-load of goods would reach Meshed from the Chaman terminus of the Quetta Railway in about 40 days, whereas from Bandar Abbas, under the most favourable circumstances, it would take not less than 75, and more often 90 days. With proper arrangements made by the local authorities in Kain, Seistan, and British Baluchistan, it is believed that the Seistan route would be preferred to all other routes, the famous Kandahar-Herat route not excepted, even if the Amir were to abolish all transit duties. The Meshed traders are also sanguine that by this means a great impetus would be given to British trade between Khorassan and India, which would thus be enabled to compete on more equal terms with Russia in almost every article except sugar, which is subsidised by bounty.

* See 'Proceedings,' 1891, p. 173.

CORRESPONDENCE.

The Geography of the Pamir.

DEAR SIR,—I have read with interest Mr. Wheeler and General Walker's remarks on the reference to M—— S——'s travels in my "Memoir on the Indian Surveys." General Walker had been good enough to mention the matter to me before. It would have been more exact if instead of saying that the Indian explorer had ascended the Murghab river "to its source in the Sarez Pamir," I had written "to one of its sources in the Sarez Pamir." I quite acknowledge this. But in the second instance complained of, where I say, respecting the Gaz Kul Lake, that "some suppose it has a double outlet into the Ishkaman and Mastuj rivers," I maintain, with all deference, that I am right and my critic wrong. I was quite aware that M. Dauvergne's information seems to indicate that there are now two lakes, separated from one another by a watershed. But very likely this ridge may be of recent formation or upheaval, and the two lakes may have been one at no remote period. It is not long since the lake was actually closed by a glacier, and we do not know what physical changes this may have occasioned. A double outlet does not necessarily mean that both outlets discharge at once, and to those who have studied the hydrography of Central Asia, and the curious fluctuations and changes undergone by its lakes, the existence of alternative outlets to the Gaz Kul Lake, whether it is one or two lakes, is not surprising. In any case, I was quite correct in stating that some authorities, viz. Hayward, Biddulph, and others, support the view. While on the subject of M. Dauvergne's travels, may I express a hope that that gentleman may be moved by you, Sir, to favour the Society with an account of his explorations, and a copy of his map? He claims to have discovered, *inter alia*, the true source of the Oxus in some huge glaciers west of the Karachunkar Pass, and his detailed notes on this interesting region would be very gratifying to your readers.

Yours truly,

CHARLES E. D. BLACK.

The Editor,

'Proceedings' of the Royal Geographical Society.

REPORT OF THE EVENING MEETINGS, SESSION 1891-2.

Fourth Meeting, 25th January, 1892.—The Right Hon. Sir M. E. GRANT Durr, *q.c.s.l.*, President, in the Chair.

ELECTIONS.—*Harry M. Becher, Esq.*; *Charles William Campbell, Esq. (H.B.M. Consular Service, China)*; *Elijah Coffin, Esq.*; *Robert Augustus Danvers, Esq.*; *Colonel Josiah Harris (Peruvian Army)*; *Thomas Henry Hewitt, Esq.*; *Captain Walter E. Hutchinson, R.N.B.*; *Willoughby Aston Littlejohn, Esq., M.A.*; *Charles Henry Malters, Esq.*; *Frederick Richard May, Esq.*; *George Henry Morgan, Esq.*; *Frederick Sessions, Esq.*; *Sidney Whitman, Esq.*

DEATH OF H.R.H. THE DUKE OF CLARENCE.

Before proceeding to the ordinary business of the evening, the President read the following letters of condolence which had been sent to Her Majesty the Queen and His Royal Highness the Prince of Wales, on the death of His Royal Highness the Duke of Clarence and Avondale :—

1, SAVILE ROW, BURLINGTON GARDENS, W.,
19th January, 1892.

To The Queen's Most Excellent Majesty.

May it please Your Majesty.

The President, Council, and Fellows of the Royal Geographical Society venture to approach Your Majesty, their Patron, with the expression of their humble loyalty, and beg respectfully to offer their heartfelt sympathy and condolence in the sudden and overwhelming grief which has fallen upon Your Majesty, Your Royal House, and all portions of Your Empire, in consequence of the death of His Royal Highness the Duke of Clarence and Avondale.

In the name and on behalf of the Council and Fellows of this Society,
I remain, Madam, Your Majesty's most humble and obedient Servant,

M. F. GRANT DUFF,
President of the Royal Geographical Society.

1, SAVILE ROW, BURLINGTON GARDENS, W.,
19th January, 1892.

To His Royal Highness The Prince of Wales, K.G., K.T.

Sir,

The President, Council, and Fellows of the Royal Geographical Society have the honour to tender to Your Royal Highness, their Vice-Patron, this expression of their deep sorrow at the terrible calamity which has fallen upon Your Royal Highness, upon Her Royal Highness the Princess of Wales, upon all Your august family, upon this Nation, and upon the Empire at large, in the death of His Royal Highness the Duke of Clarence and Avondale. They beg to be permitted to offer to Your Royal Highness and Her Royal Highness the Princess of Wales their warmest sympathy and most sincere condolences on this deplorable event.

I have the honour to remain, Sir, Your Royal Highness's most obedient humble Servant,

M. F. GRANT DUFF,
President of the Royal Geographical Society.

The paper read was :—

"Journey through North Korea into Manchuria." By Charles W. Campbell, Esq. (H.M. Consular Service, China).

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Berlin.—December 5th, 1891: Dr. W. REISS in the Chair.—Dr. G. Wegener read a report upon the International Geographical Exhibition at Bern.

DR. WOLF ON THE HIGH ANDES OF ECUADOR.

Dr. Th. Wolf, late Government Geologist to the Republic of Ecuador, then spoke upon the geographical conditions of the High Andes of Ecuador. The speaker had on exhibition at the meeting a large map, prepared by him on the basis of his twenty years' explorations in this republic. A striking feature of this map is that the whole of the Ecuadorian highland is placed considerably more to the east than on Humboldt's and the more recent maps. We are indebted to the celebrated French expedition for the measurement of an arc of the meridian sent out by the Paris Academy in the last century, for the first fixing of positions in the highland of Ecuador. Sixty years later Humboldt corrected these positions, and placed them generally much more to the west. These latter positions have hitherto formed the foundation for the maps of the interior of the country. Then in the forties came the accurate English surveys of the Pacific coasts of South America. The English Admiralty maps were rightly regarded as the best groundwork for maps of the coast regions; they showed, nevertheless, considerable differences of longitude from Humboldt's determinations of the coast places. Thus, Punta Parilla lies 4' 39", Cabo Blanco 3' 16", and Guayaquil 6' 37" more to the east than Humboldt supposed. Similar alterations were rendered necessary by Wertheimann's observations in the upper Amazon region. The supposition that in the interior high land, also, Humboldt's positions needed to be revised, was confirmed by the accurate surveys made in connection with the construction of the railway from Guayaquil to Puente de Chimbo, and also by the trigonometrical measurements which connected the latter point with Alausi. The last-mentioned place lies, according to these surveys, about 20' more to the east than Humboldt put it. In spite of all the efforts of Dr. Wolf, a revision of the longitude of Quito was not to be obtained from the head of the observatory of that city. On the other hand, the result of the observations of Dr. Reiss and Dr. Stäbel, which have not yet been published, is that, for example, Bogota lies about 14' 15", Pasto 6' 15", and Quito 16' 44" more to the east than Humboldt placed them. With regard to the configuration of the Ecuadorian Andes, it should be observed that the Andes of Peru, where they cross the southern boundary of Ecuador, are a single and extremely simple range. This Cordillera runs in a fairly straight line from south to north, through two degrees of latitude, as far as beyond Loja, ascending gradually in height from 6500 feet to 13,000 feet. The western slopes, which are so arid and bare, become constantly richer in springs, and at Tumbes, under 34° S. lat., the desert coast zone also disappears entirely. The Cordillera, at this point, sends out spurs to the east and west, whence, among others, the Rio Chinchipe, the first great tributary which the Marañon receives from the north, takes its rise; but these spurs sink down quickly, and are not connected with any other long mountain chain. There are no cross ridges, no so-called "mountain knots." The first forking of the Cordillera occurs about two miles south of Loja, at the mountain knot of Cajanuma. Between two cordilleras of similar geological and geographical formation lies the high valley of Loja, the waters of which burst through the Eastern Cordillera along a deep, narrow gorge, and form the headwaters of the Rio Zamora, an important affluent of the Amazon. In the middle of the high valley lies the town of Loja, at an altitude above the sea of about 7200 feet. The Eastern Cordillera is on the

average about 13,000 feet high, and the Western about 10,000 feet; both are situated wholly in the region of the old crystalline slates. The Eastern Cordillera throughout the whole of the southern part of Ecuador, and in the northern part, at least in its centre, consists of gneiss, mica-slate, primitive clay-slate, and partly also of primitive granitic rock. This Cordillera is the more primitive and the older; it has the more regular and unbroken course, and is, in addition, of a greater average height. The inhabitants recognise its superiority by designating it "Cordillera real" or Chief Cordillera. The Western Cordillera is composed of other elements. In the very deep valleys one finds, it is true, old crystalline rocks, but the range itself is composed of diorite, diabase, porphyry, propylite, and indefinable green stones of every kind, and, further, of sedimentary strata of chalk formation, which project in the form of steep cliffs. The very heterogeneous character of the rocks of the Western Cordillera explains the greater diversity and multiplicity of its phenomena and the greater irregularity of its course. The basin of Loja is shut off on the north by the Cordillera of Chilla. The junction of this Cordillera with the Eastern Cordillera forms the mountain knot of Acayana and Guagrauma. This cross ridge consists entirely of porphyritic rocks, and here are thousands of gold-bearing quartz veins, which make this the richest mining district of Ecuador. The Eastern Cordillera continues as a lofty and broad chain, with a wide bend to the province of Cuenca, but soon sends out a second great cross ridge of porphyritic rocks, forming the knots of Portete and Tinajas. The basin, which lies between, is that of the Jubones. The bifurcation of the Cordillera commences much earlier than supposed by Humboldt, who never saw that part of the country which lies to the west of Loja. The high basin of Cuenca is one of the most beautiful in the Andes; its central parts, including the chief town of the province, stand at an altitude of about 8460 feet. In the north, it is shut off by the offshoots of the mountain knot of Azuay. The river system of the high valley is that of the Rio Paute, which, penetrating the Eastern Cordillera, flows down to the Zamora. Its headwaters lie only eight geographical miles, as the crow flies, from Guayaquil! The irregular mountain mass of Azuay stretches out its long arms in every direction, two of which, after a roundabout course, terminate at the Western Cordillera, which are here very low. One of these arms makes a wide sweep to the south into the basin of Cuenca and then goes through the mountains of Molobog and Bueran, past the little town of Cajas; the other takes a more westerly course. Between the two lies the little high basin of Cajas at an altitude of 10,490 feet. North of Azuay there is a small, irregular basin, formed by the broad and deep valley of the Rio Chanchan, which may be regarded as the basin of Alausi. To the north of the Rio Chanchan, the Western Cordillera rises again quickly to its earlier height, and continues its course with a well-defined central ridge to Chimborazo. Under 2° S. lat. the mountain knot of Tucasas is formed by a broad plateau, 10,800 feet high, which slopes down gently to the north into the basin of the Rio Bamba. From Azuay onwards the ridge of the Eastern Cordillera becomes of much greater extent. The original mountains are, as the result of volcanic action, completely covered over for long distances by a second higher range, which has been built up on top of the already lofty Cordillera. The series of gigantic volcanoes commences with Sangay (17,380 feet), the most active volcano in the world; then comes Altar or Coliara (17,710 feet), and next Tunguragua (16,680 feet), which some years ago, after a rest lasting for centuries, commenced its activity again with terrible devastation. Opposite to this mountain stands Chimborazo (20,680 feet), on the Western Cordillera. In the middle, between the two, Iguala (14,590 feet) interposes the formation of a lofty cross-ridge, which is only penetrated by the Rio Chambo, and which separates the basin of the Rio

Bamba from that of Latacunga. The basin of Chimbo, which drains into the Guayaquil, is formed by a third Cordillera running parallel with the Western Cordillera, similar to it geologically, and connected with it north of Chimborazo. The high basin of Latacunga and Ambato is shut off in the north just as in the south. A volcanic barrier interposes itself between Cotopaxi (12,480 feet) and Illimiza (17,380 feet), with the assistance of Rumiñahui (15,540 feet) and the smaller Cerros de Chaupi, and forms the broad saddle of Tiopullo (Humboldt's Chimbo). The waters of the valley of Latacunga flow southwards, and, uniting with those of the basin of the Rio Bamba, flowing down to the north, drain into the Rio Pastaza, which bursts through the Eastern Cordillera. This breach is the last transverse valley of the Eastern Cordillera, for the basins of Quito and Ibarra, which now follow, drain into the Pacific. By the basin of Quito, the Western Cordillera is a narrow and low (10,000 feet) range, raised only by the super-imposed volcanoes, especially Corazon (15,804 feet), Atacazo (14,890 feet), the many-pointed Fichincha (15,804 feet), and Pululagua (9510 feet). Immediately under the Equator, the Western Cordillera sinks down more than 4000 feet into the deep transversal valley of the Rio Guallabamba, which drains the Quito basin. The Eastern Cordillera is much more complicated; here the most interesting volcanic groups in the country are found. Following on Cotopaxi comes Stichelagua (16,360 feet), with Antisana (18,885 feet) appearing behind; around and between these principal peaks, a number of smaller volcanic summits are grouped as far as Cayambé (19,460 feet), the third loftiest mountain in the country, with its huge mantle of snow and ice. The northern cross-ridge is formed principally by Mojanda (14,000 feet), which on the east stands in connection with Cayambé, by means of the broad saddle of Cajas with Cusin (13,150 feet), and then the *Paramos* of Pesillo. With Cayambé closes the series of volcanoes on the Eastern Cordillera. The Eastern Cordillera continues its course to Colombia, continually increasing in height and breadth, but in more peaceful forms, and sending out important spurs to the east between the headwaters of the Rio Napo and the Rio Putumayo. The Western Cordillera rises to a more considerable altitude in the province of Quito. It is crowned by two lofty volcanoes, Cotacachi (16,296 feet) and Yanaurcu (14,000 feet), and slopes down to the north-west into the broad valley of the Rio Mira, which drains the basin of Ibarra to the west. On the other side of the valley, the mountains quickly rise again to a lofty paramo region; but before this is reached there is a somewhat undefined middle ridge, which shows again on the confines of Colombia, where it is crowned by two volcanoes, Chiles (15,675 feet) and Cumbal (15,710 feet). But even south of that the basin is terminated by the paramo region of Altos de Boliche (10,000 to 11,500 feet); the latter constitutes the watershed between the Rio Mira and the Colombian Rio Patia. In the middle of the basin of Ibarra the frowning summit of Imbabura (15,020 feet) towers aloft, and at its northern foot lies Ibarra at an altitude of 7380 feet.

The landscape of the Ecuadorian Andes has nothing of the alpine character. It is one *res generis*. In fact, the alpine and the Andine characteristics are almost exact opposites of the each other. The outer slopes of the Cordillera are covered, from the plains almost up to the tree-limit (10,000 feet), with dense virgin forest, which is practically uninhabited, and through which one can work one's way only with the utmost trouble, even along the so-called paths. It is only in a few valleys that the traveller comes upon small sugar-cane and coffee plantations and primitive sugar mills, the so-called "trapiches." Few days are free from rain; everything drips with moisture; a stifling sultriness prevails; body and spirit suffer from extreme relaxation. The people, who are compelled to live here, are like walking skeletons, wasted away by fever and dysentery, indolence and enervation. What a relief the traveller experiences when he reaches the cooler regions at a height of 6750 feet,

after he has successfully crossed fathomless morasses full of decaying vegetation, clambered over enormous heaps of rubble and great blocks of rock, and scaled slippery walls of mud. The higher one ascends, the thinner the forest becomes; the trees become gnarled and stunted; more extensive slopes, grown over with grass and low bush, come into view, and at last the way lies along a narrow path through tall tufted grass, which forms a uniform covering over everything as far as the eye can reach. The traveller has now arrived on the paramo, and is at an altitude of from 10,000 to 11,000 feet. Along most of the routes into the interior the steep passage across the mountain is accomplished in from one to one and a half days. The journey over the paramos occupies a longer or a shorter time, according to the breadth of the ridge of the Cordillera; at some points it is necessary to ascend 3000 feet higher, and traverse ridges wholly destitute of vegetation, and often covered with snow. On reaching the summit of the crest, the traveller looks into quite a new world. About 1500 feet below him extends a valley from two to three miles broad, and from four to five miles long, encircled by mountain walls 13,000 feet in height, and dominated by separate snow cones. The slopes and plains are covered with fields of wheat, barley, potatoes, and lucerne, and with villages with houses of stone or bricks (*adobes*). It is quite a northern picture. Long alce and cactus hedges separate the fields, and the straw-covered mud huts of the Indians are scattered about everywhere. The forest disappears entirely, only here and there is there a narrow stretch of brushwood between the cultivated zone and the higher paramos. Isolated capuli trees grow on the fields, but their sour fruits are worse than our wild cherries. The strong contrast with the alpine landscape is seen in the absence of the long mountain ranges, covered with eternal snow, with their jagged peaks and horns. The upper parts of the mountains of this region are, as a rule, rounded off and covered all over with the olive-brown paramo grass. One misses, also, almost completely, the contrasts between glaciers, rugged cliffs of rock, sap-green alpine meadows and dark pine forests. The lofty snow-covered volcanoes, each one in itself a natural wonder, appear too isolated. The high valleys of the Andes cannot be compared in the remotest way with those of the Alps. In the valleys of Ibarra, Cuenca, and Loja there are spots where the moderate climate, sufficient irrigation, and fertile soil allow of rich harvests with the smallest amount of tilling, and where myrtle and orange groves flourish; but such places are few and far between. Two-thirds of the soil is waste and uncultivated; the fields give a bad impression of the indolence of the inhabitants. In place of the jagged crooked-pointed piece of wood is frequently used, and instead of draught-animals, a couple of Indians. The corn is trodden out on the fields by oxen; the maize grows only to a height of from two to three feet, and requires eleven months to ripen; the potatoes almost as long. The Ecuadorian highland is a very poor country, and does not share in the much-praised fertility of tropical lands. Most of the houses are windowless huts, full of dirt and vermin, and the inhabitants are clad in rags. The silence of the grave broods over these valleys, and a kind of deep melancholy, which is always found in the Indian of these highlands, communicates itself to the traveller. Inasmuch as the high valleys comprise only a very small area, the highland of Ecuador may be regarded as a paramo country. Under the term "paramo" are to be understood the mountain regions lying above 10,000 feet, where the harshness of the climate does not permit fields to be cultivated, and which are characterised by a uniform grass vegetation, on which half-wild cattle pasture. The forest is very seldom met with, only in sheltered places. At an altitude of 11,150 feet Dr. Wolf on his way from Cuenca came across on the Eastern Cordillera a group of tree-ferns, 20 feet high, covered with snow. The tall coarse *lachu* grass never changes its yellowish-brown because it is never summer or

winter in this region. The mean temperature of the year, of from 39° to 46 F., according to the situation, is the same for every month, and almost for every day. Another characteristic feature are the clouds, which continually form and reform, and which often shroud the higher parts of the mountain for weeks together, and more than once every day precipitate themselves in fearful storms of rain, snow, or fine hail. After such storm-peroxyms the sun may perhaps shine out quite warm, but the bad weather soon commences afresh. It is continuous April weather of the most detestable kind, which sometimes lasts for weeks, and just at the very season when the deep parts of the high valleys experience the most beautiful weather, and there is little rain.

The cold experienced in the clouds and rain of the paramos is so penetrating that it immediately causes lameness, and it not infrequently happens that whites and Indians, when overtaken by bad weather, get benumbed and perish. Every one therefore endeavours to make his journey across the paramo as quickly as possible. Desolate and melancholy indeed is the prospect presented by the paramo; not a tree, or even a shrub, much less a human habitation to vary the monotony, or to afford protection. The sensation of loneliness follows the traveller everywhere. Animal life is very poorly represented. With the exception of the half-wild cattle, one might often travel for weeks without seeing any large quadruped. The paramo stag, the mountain lion, the bear, the fox, the woolly-haired tapir, are seldom seen; smaller quadrupeds are hidden by the grass. Some lazy vultures and smaller birds may be said rather to complete the picture of desolation than to enliven it. Of amphibians the only specimen met with was a small black toad, which announces and accompanies every shower of rain with its melancholy croaking. The few representatives of the insect world are without beauty. Thus there is a note of sadness running through the whole of nature on the paramo, which communicates itself to the inhabitants also.

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELLIE, *Librarian M.S.*)

EUROPE.

Chair, Émile.—*La Vallée del Bove et la Végétation de la Région Supérieure de l'Etna.* Genève, R. Burkhart, 1891: 8vo, pp. 32, plates. [Presented by the Author.]

Diener, (Dr.) Carl.—*Der Gebirgsbau der Westalpen.* Vienna, 1891: 8vo, pp. v. and 243, with 2 maps.

Partly on the ground of his own explorations in Graubünden and Wallis, but chiefly on the basis of the geological literature of the Alps, Dr. Diener endeavours to bring to light the differences in the structure of the Western Alps and the Eastern Alps. The former display, in the author's opinion, a great unity of structure and, although three different series of upheavals took place at three different geological epochs, nevertheless, the same force acted each time in a direction perpendicular to the present prolongation of the strata. The Eastern Alps, on the contrary, have no such unity of structure. The work is divided into five chapters:—1. The structure of the Italian-French part of the Alps; 2. The outer Alpine zones, and the Mont Blanc zone, continued beyond the Rhine; 3. The structure of the Pennine and Apennine Alps; 4. The relations between the Monte Rosa zone and the Eastern Alps; and 5. The structure of the Western Alps compared with the structure of the Eastern Alps. The theories of the author are illustrated by two maps, which give the leading lines of the structure of the Alps, as well as the distribution of the "central nuclei."

and the chief stratified formations. We cannot but remark that while the views of the author as to the complicated structure of the Eastern Alps are fully supported by evidence—so much so that we are inclined to suspect therein traces of upheavals running south-east to north-west—his view of the Dauphiné and Maritime Alps (chiefly based on the works of others) is not so well supported by modern research. The more these Alps are studied, the more we realise their extremely complicated structure, and are bound to look for several lines of upheaval instead of the one curved line which formerly used to be drawn from the Mediterranean to Tyrol, and which we also find in the author's scheme.—[P. A. K.]

[German Rivers.]—Statistik des Deutschen Reichs. Herausgegeben vom Kaiserlichen Statistischen Amt. Neue Folge, Band 39, Theil I. Berlin, Puttkammer & Mühlbrecht, 1891: 4to, pp. xi. and 301.

This volume deals with the river systems of the Memel, Pregel, Vistula, Iela, Lupa, Stolpe, Wipper, Persante, Rega, Oder, Ryk, Recknitz, Warnow, Trave, all of which flow into the Baltic. It contains numerous tables, which afford detailed information about the altitudes above sea-level of stations on or near the rivers; the high, mean, and low water marks, fall of the rivers, &c., as well as of the shipping and trade carried on in different parts of them. Hydrographical and orographical descriptions of the districts in question are given, and notes are added on river regulations, canals, locks, bridges, &c. The volume is a good handbook of the subjects indicated, and the many carefully ascertained altitudes above sea-level are of interest to geographers.

Toula, (Prof. Dr.) Franz.—Der Stand der Geologischen Kenntnis der Balkanländer. Berlin, 1891: 8vo, map. [Presented by the Author.]

ASIA.

[Anglo-Russian Question in Central Asia.]—"The Anglo-Russian Question in Central Asia, and the Defence of India." (Translated from the 'Revue Militaire de l'Etranger' for May 1891.) By Captain H. B. B. Watkin.—'Journal United Service Institution, India,' vol. xx. No. 88, pp. 367-383. Simla, 1891: 8vo.

Carthaus, (Dr.) Emil.—Aus dem Reich von Insulinde. Sumatra und der malaisische Archipel. Leipzig, W. Friedrich, 1891: 8vo, pp. vi. and 267.

Dallas, W. L.—The Climatology of Afghanistan.—'Journal of the United Service Institution of India,' vol. xx. No. 88, pp. 331-339. Simla, 1891, 8vo.

Harnisch, (Dr.) A.—Afghanistan in seiner Bedeutung für den Volkerverkehr, mit besonderer Berücksichtigung englischer und russischer Quellen. 'Zeitschrift für Wissenschaftliche Geographie,' Band viii. Heft 9 and 10, Weimar, 1891, pp. 229-381.

This is a useful memoir, compiled from a variety of sources, on the industrial and commercial geography of Afghanistan.

Le Strange, Guy.—Palestine under the Moslems. A Description of Syria and the Holy Land from A.D. 650 to 1500. Translated from the Works of the Medieval Arab Geographers. Published for the Committee of the Palestine Exploration Fund by A. P. Watt, 1890: 8vo, pp. xxii. and 604, maps, plans, and illustrations. Price 12s. 6d.

Norman, Henry.—The Real Japan: Studies of Contemporary Japanese Manners, Morals, Administration, and Politics. London, T. Fisher Unwin, 1892: 8vo, pp. 364. Price 10s. 6d. [Presented by the Publisher.]

Consists of a series of essays, dealing with such matters as—The life in Japan, Japanese Journalism, Justice, and Education, Japan as an Eastern

Power, Arts and Crafts in Japan, Japanese women, &c., concluding with a chapter on the future of Japan. The volume is illustrated from photographs by the Author, but there is neither index nor map.

Petrie, W. M. Flinders.—Tell el Hesi (Lachish). London, Published for the Committee of the Palestine Exploration Fund, by A. P. Watt, 1891: 4to, pp. 62. Price 10s. 6d.

An account of the excavations at Tell el Hesi, the ancient city of Lachish, with view of the Tell, plans and section, and a number of drawings of the objects found.

Rosny, Léon de—Chan-hai-king. *Antique Géographie Chinoise traduite pour la première fois sur le texte original.* Tome premier. Paris, Maisonneuve, 1891: 8vo, pp. 408. Price 24s.

This is the first instalment of a translation of an ancient Chinese Geography called the Shan Hai Ching, or Classic of Mountains and Seas, which is said to claim an antiquity dating at least from the Chow dynasty (n.c. 1122-255). According to Wylie, it proposes to give a description of charts engraved on nine vases belonging to the Great Yu, a legendary emperor who is reputed to have ruled China in n.c. 2200.

The present volume furnishes a translation of the first five books of the original, together with a running commentary, most of which has been obtained from Chinese sources—principally from Kuo P'o, a famous scholar and annotator of ancient writings, who flourished in the third century of our era. Prof. de Rosny's notes give much information on the Chinese nomenclature of plants and animals. A critical examination of the whole work is promised as soon as the translation of the text has been finished. Considering that the Shan Hai Ching is one of the very oldest works on geography existing in any language, this translation cannot fail to interest many readers and students.

Schumacher, Gottlieb.—Northern 'Ajlän, "within the Decapolis." Published for the Committee of the Palestine Exploration Fund. London, A. P. Watt, 1890: 8vo, pp. 207, map, plans, and illustrations. Price 3s. 6d.

Yate, [Capt.] A. C.—Notes on a Journey to Tashkent and back in September-October 1890.—'Journal United Service Institution, India,' vol. xx. No. 88, pp. 341-355. Simla, 1891: 8vo.

AFRICA.

Cust, E. N. [LL.D.]—Africa Rediviva, or, the Occupation of Africa by Christian Missionaries of Europe and North America. London, Elliot Stock, 1891: small 4to, pp. x. and 118, maps and frontispiece. Price 5s. [Presented by the Author.]

Decotter, N.—Géographie de Maurice et de ses Dépendances. Maurice, 1891: 8vo, pp. vii. and 123. [Presented by the Author.]

This little book is written for the purpose of improving the teaching of geography in the schools of Mauritius. The author deserves credit for the effort he has made. The book consists largely of crowds of names—names of capes, rivers, towns, railway stations, plants, animals, and so on—and of tables of statistics. If Mr. Decotter would make himself acquainted with what has been done to improve geography in England, he would probably omit most of these lists, and otherwise render his book both more attractive and more really instructive.

Portal, Gerald H. [C.B.]—My Mission to Abyssinia. London, E. Arnold, 1892: 8vo, pp. vi. and 261. Price 15s. [Presented by the Publisher.]

In 1887 Mr. Portal was entrusted with the English Mission to Abyssinia for the purpose of bringing about, if possible, a pacification between King Johannes, or King John as he is sometimes called, and the Italian Government. In the present volume he narrates his adventures to and from the King's camp,

with incidental notices of the comparatively little-known country through which he passed and of the people with whom he came in contact. The route followed by the Mission on leaving Massowah was by way of Asmara, through the heart of the Tigré region, by Gandet and Sokota—the latter place, Mr. Portal states, lying in reality about 30 miles to the south-west of the position in which it is marked on the maps—to Wofela and Ashangi, the return journey being made by a different route. With the exception of having been detained as prisoners at Asmara, by Ras Alula, the Abyssinian chief, the members of the Mission appear to have suffered little inconvenience from the people themselves.

In its original object the Mission appears to have been successful, no collision, as Mr. Portal points out, having as yet taken place between the Abyssinian and Italian armies. The volume contains a number of illustrations, a portrait of the author, and a map of the route followed by the Mission.

AMERICA.

Levasseur, E.—*Le Brésil*, par E. Levasseur, avec la collaboration de MM. de Rio-Branco, Eduardo Prado, Viscomte d'Ourém, Henri Gorceix, Paul Maury, E. Trouessart et Zaborowski. Deuxième édition. Paris, H. Lammult & Cie., 1889: 4to, pp. viii. and 100, maps, diagrams, and illustrations. [Presented by Viscomte d'Ourém.]

This is an extract from the 'Grande Encyclopédie,' and is one of the best geographical accounts of Brazil that has appeared. It is accompanied with an album of very fine views executed under the direction of J.-M. Da Silva-Paranhos, Baron de Rio-Branco.

Steel, W. G.—*The Mountains of Oregon*. Portland, Oregon, David Steel, 1890: 8vo, pp. 112, plates. [Presented by the Author.]

Includes descriptions of Crater Lake, Mounts Hood and Rainier, and the Josephine County Caves in the territory of Oregon.

AUSTRALASIA.

Crozet's Voyage to Tasmania, New Zealand, the Ladrone Islands, and the Philippines in the years 1771-1772. Translated by H. Ling Roth. With a preface and a brief reference to the literature of New Zealand, by Jas. R. Booth. London, Truslove & Shirley, 1891: 8vo, pp. xxiii. and 148. Price 10s. 6d.

The first account of Crozet's Voyage was published in Paris in 1783 under the title of "A New Voyage to the South Seas, commenced under the Orders of M. Marion." This work was compiled and edited from the papers of M. Crozet by the Abbé Rochon, himself a distinguished traveller. Mr. Ling Roth has apparently taken great pains over the present translation, the explanatory notes adding much to its value. "The Voyage of Marion de Fresne, or Crozet's Voyage, as it is otherwise known, was performed during the year 1771, and is a modest account of the exploration of a party of Frenchmen which went in search of the great land which, in those days, was supposed to exist somewhere in the Southern Ocean. It embraces an account of the discoveries made in Van Diemen's Land and New Zealand, the various troubles the party met with, the massacre of part of the expedition, including the Commander, by the Maories, the sojourn at the Ladrone Islands, and the final arrival at the Philippines, all of which incidents are graphically described." There are two maps specially draughted for this translation, one showing the general route of the expedition, prepared from Crozet's log, under the superintendence of M. J. Renaud, Hydrographer-in-Chief to the French Admiralty; the second one, showing the movements of the expedition in the Bay of Islands, New Zealand, where Marion was killed, the editor has prepared from Crozet's two charts in the Naval Archives at Paris. The illustrations are well done and include a few representations of some of the choicest works of Maori Art.

Taylor, Alfred J.—*A Chat about the Aborigines of Tasmania: with some reflections on the subject.* [A lecture delivered at the Memorial Hall, Hobart, No. II.—Feb. 1892.]

October 30th, 1891.] Also, some Notes on the Shell-mounds at Little Swanport. [A paper read before the Royal Society of Tasmania, October 19th, 1891.] Hobart, 8vo, pp. 23.

GENERAL.

Castillo, Rafael del.—Gran Diccionario geográfico, estadístico é histórico de España y sus Provincias de Cuba, Puerto Rico, Filipinas y posesiones de Africa. Tomo II. [E—Mist.] Barcelona, 1890: 4to, pp. 664, maps.

Langenbeck, (Dr.) B.—Die Theorien über die Entstehung der Koralleninseln und Korallenriffe und ihre Bedeutung für Geophysische Fragen. Leipzig, 1890: 8vo, pp. 190.

This little work supplies a decided want in geographical and geological literature, as it gives in a reasonable space a detailed analysis of the recent controversy on the origin of coral reefs and an impartial and lucid review of the difficulties standing in the way of each of the theories recently advanced. In an introductory chapter the author briefly reviews: Darwin's theory; Dana's theory slowly modified upon the preceding; the objections against both, raised by Semper; the still more serious attacks by Prof. Rein; the researches of Pourtalès; Mr. Murray's theory, supported by Studer; Rein's further remarks; Sir Arch. Gukie's review of the objections to Darwin's theory; Mr. Guppy's careful observations and their influence in bringing round most geographers to his views; the refutation of Mr. Murray's and Mr. Guppy's views by Dana; and the support given to Darwin's and Dana's views by the Vienna Professors Suesz and Neumayr. The character of the book is best seen from the following titles of the different chapters:—1. Coral reefs in stationary regions and regions having a negative motion (the author follows Suesz in using the terms "positive" and "negative motion" instead of "upheaval" and "subsidence," as they do not imply in anticipation the cause of the change of the relative level of the sea); 2. The theories of Murray and Guppy cannot explain the structure of many atolls and barrier-reefs; 3. The appearance of the three different forms of reefs in regions near to each other. Passages from positive to negative motion; 4. The coral reefs of former geological periods; 5. Present distribution of coral reefs. Positive and negative motion (upheaval and subsidence) proved; 6. Geo-physical considerations. The last chapter contains considerations of general interest for the geographer. As to the conclusions arrived at by the author, he sums them up himself in the preface as follows:—"It will now be my task to prove that some of the facts upon which objections to Darwin's and Dana's theory were based, were not correct, and that the others can easily be brought into accordance with the theory; and that the theory explains the peculiarities in the structure of the atolls and the barrier-reefs in a quite satisfactory way, while Murray's and Guppy's theories are not in a position to do so, and are contradicted by a series of important facts." [P. A. K.]

Montefiore, Arthur.—Leaders into Unknown Lands. London, S. W. Partridge & Co., crown 8vo, pp. 320, maps and illustrations. Price 2s. 6d. [Presented by the Author.]

This volume consists of six chapters, dealing with the most famous journeys of modern times, including Livingstone's march across Africa from the west coast to the east; Burton's pilgrimage to Mecca; Stuart's journeys across Australia; the travels of Alfred Russell Wallace in the Malay Archipelago; Stanley's memorable descent of the Congo; and the famous journey across Greenland by the young Norwegian naturalist, Fridtjof Nansen. The book is principally intended for the general reader, who will find in it a good summary of the work accomplished by the travellers with which it deals.

Whymper, Edward.—How to Use the Aneroid Barometer. London, John Murray, 1891: 8vo, pp. 61. Price 2s. 6d.

In this little book Mr. Edward Whymper gives the results of his investigations into the working and use of aneroids, which have extended over eleven years. The value of his work is greatly enhanced by the fact that all his

experiments have not been made with the air-pump in the workshop, but were, to some extent, actually carried out during his travels, when he was for a length of time at great elevations in the Equatorial regions of South America.

The author divides his book into four parts. The first records comparisons of the aneroid against the mercurial barometer in the field; the second is concerned with experimental research in the workshop; the third has reference to practical considerations, arising from the facts recorded; and the fourth is a recapitulation of the principal points which are dwelt on in the previous parts.

The book is written in a clear and practical style, the results of observations being given in tabular form to facilitate comparison, and in this way many important facts with regard to the working of aneroids are brought to light. Mr. Whympere's remarks on the methods by which aneroids are tested are well worthy of attention; he points out that when an aneroid is tested at Kew Observatory, inch by inch down as low as 15 inches, it is unusual to occupy more than an hour in the operation, and that as this is also about the usual time occupied in laying off the scale on the dial during the manufacture of aneroids, such a verification amounts to no more than a repetition of the process which the aneroid has already undergone in the course of manufacture, and one does not learn from it the errors that will be manifested by the aneroid if it is subjected to reduction of pressure for a greater length of time. There can be no doubt, as most clearly shown by the author's experiments, that such hasty tests are valueless in the event of the instrument having to be used for any length of time at great altitudes, and his remarks clearly point to the necessity of an alteration in the system of testing at present in use. This is only one out of several important points to which Mr. Whympere calls attention, and any person who contemplates purchasing aneroids to be used for the approximate determination of altitudes, cannot do better than read Mr. Whympere's book carefully. He will find that it contains much information that will be valuable to him, and his knowledge of the use of this important instrument will in all probability be considerably increased.—[J. C.]

Winsor, Justin.—Christopher Columbus; and how he received and imparted the Spirit of Discovery. London, S. Low and Co. [1891]: 8vo, pp. xi. and 674. Price 21s.

The chief value of Mr. Winsor's book consists in the completeness with which he sets before his readers a view of all the authorities for the life of Columbus, and the care he has taken to furnish an estimate of their relative values. A number of stories relating to the great navigator, which have become current owing to their adoption by Washington Irving, must now be mentioned altogether. They have been proved to be impossible. On the other hand, the indefatigable research of the Marquis Staglieno in Genoa, of Puro and Asencio in Spain, and above all of Harrisse, wherever information could be found, has thrown much new light on the events of the Admiral's life. Several difficult questions, however, still await solution. Mr. Winsor has brought together, in a convenient form, most of the results of recent research, and his work will be exceedingly valuable to students who intend to read the original authorities. In several instances Mr. Winsor gives the arguments for and against the truth of a statement, leaving the question still in doubt, and as a rule he avoids expressing his own conclusion. But though his treatment of all questions of fact is fair and judicial, he descends from the judicial bench, and assumes the rôle of advocate for the prosecution when any point relating to the disposition or character of Columbus himself has to be discussed. Where language which appears ambiguous in the Admiral's letters, or acts of his that have been called in question, are capable of two interpretations, Mr. Winsor is generally inclined to adopt the one which is most injurious to his character. This attitude appears to have been taken as a protest against what Mr. Winsor considers to be the extravagant adulation of the earlier biographers; but it is to be regretted, as it somewhat mars the pleasure, derived by an enquirer, from reading this excellent and useful work. The book is profusely illustrated throughout, and the numerous reproductions of old maps, in the final chapter on the geographical results of the discoveries of Columbus, are particularly interesting and instructive.

"Africa Rediviva" or missionary occupation of Africa. Scale 1:12,000,000 or 164·4 geographical miles to an inch. [Presented by the Author.]

This map has been specially prepared to show the missionary occupation of Africa. The societies to which the different missionary stations belong are indicated by letters, the signification of which is given in a note in the corner of the map.

Deutsch-Ost-Afrika.—Spezial-Karte von —. Scale 1:3,000,000 or 41·6 geographical miles to an inch. Third edition. Lief. 1, containing two sheets (to make 6 Lief., 12 sheets.) Weimar, Geographischer Institut. Price 1s. 6d. (Dulau.)

AMERICA.

Costa Rica.—Karte der Berggruppen Buena Vista und Chirripó sowie der anliegenden Thäler auf dem Südwestlichen Abhang der Republik Costa Rica. Entworfen von Prof. H. Pittier, Direktor des physikalisch-geographischen Instituts von Costa Rica, 1891. Scale 1:500,000 or 6·8 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1892, 'Tafel 1. Gotha, Justus Perthes. (Dulau.)

Rand, McNally & Co.—Indexed County and Railroad Pocket Maps and Shippers' Guides of Massachusetts, scale 1:474,600 or 6·5 geographical miles to an inch; Colorado, scale 1:1,014,700 or 13·9 geographical miles to an inch; Connecticut, scale 1:503,700 or 13·9 geographical miles to an inch; Oregon, scale 1:503,700 or 13·9 geographical miles to an inch; Pennsylvania, scale 1:759,200 or 10·4 geographical miles to an inch; Washington, scale 1:503,700 or 13·9 geographical miles to an inch; New York, scale 1:832,500 or 11·0 geographical miles to an inch. Rand, McNally & Co., Chicago. [Presented by E. Stanford, Esq.]

These maps belong to an excellent series in course of publication by Rand, McNally & Co., of Chicago and New York. By means of symbols attached to the names of places, a large amount of information is given that cannot fail to be of service to persons travelling in the United States, either on business or for pleasure. With the assistance of the index which accompanies these maps, the nearest mailing point to any place on the map, the name of the express company doing business there, the position of the most convenient telegraph station, and other items of useful information can be found. The maps are clearly drawn, particular care having been taken to lay down the railway systems correctly.

CHARTS.

Admiralty.—Charts and Plans published at the Hydrographic Department, Admiralty, in November and December, 1891.

No.		Inches.	
1613	m =	1·0	England, south coast:—Bigbury bay to Exmouth, showing approaches to Salcombe, Dartmouth, and Tor bay, 2s. 6d.
1619	m =	6·9	Scotland, west coast:—Lamlash harbour, 2s.
2131	m =	1·55	Scotland, west coast: Arran island to Gare loch, including the firth of Clyde, the Kyles of Bute, and Inchmarnock water, 3s.
1615	m =	4·0	Spain, east coast:—Port Selva, Rosas bay, Port Cadaques, 1s. 6d.
	m =	5·6	
	m =	6·4	
1166	m =	7·3	Mediterranean, east coast of Corsica:—Bastia, 1s. 6d.
1820	m =	0·7	Mediterranean, archipelago:—Andros island and Doro channel (plan, Steno pass), 1s. 6d.
445	m =	5·3	Black sea:—Pyrgos or Burghaz bay, 2s.

No.		Inches.	
1566	m =	4.2	Asia Minor, gulf of Smyrna :—Foujes, 1s.
1509	m =	3.6	Mediterranean, north coast of Africa :—Approaches to Benzert, 1s. 6d.
1631	m =	3.0	North America, Labrador :—Blanc Sablon, Fortean bay, 2s. 6d.
1138	m =	6.0	North America, Labrador :—Red bay, 2s.
1507	m =	2.0	Canada, lake Superior :—St. Joseph channel, Wilson channel, 1s. 6d.
2008	m =	1.06	West Indies :—Virgin islands, 3 sheets (Re-published) { 1s. 6d. 1s. 6d. 3s.
2019			
2452			
2012	m =	3.9	West Indies :—San Juan del Norte or Greytown, 1s. 6d.
2448	m =	1.0	North America, west coast :—Approaches to Fitz Hugh and Smith sounds (plan, Takush harbour), 2s.
1424	m =	0.25	Bay of Bengal, Orissa coast :—Bimlipatam to Gopalpur (plans, Baruva anchorage, Pundi river entrance, Bimlipatam anchorage), 2s.
1644	m =	0.17	Bering sea :—Komandorski islands (plans, Medni island, Nikolaki anchorage, Staraya harbour, Preobrajenski harbour, Pestchanni bay), 2s.
772	m =	various.	North Pacific ocean :—Islands and reefs in the Caroline islands, 2s. 6d.
158	Italy, west coast :—New plan of Piombino.		
443	Cuba :—Plan added, El Portillo.		
2406	Haiti :—Plan added, Cabarete anchorage.		
1908	Lower California :—New plan of Asuncion bay.		
17	Santa Cruz islands :—Plan added, Graciosa bay.		

(J. D. Potter, Agent.)

CHARTS CANCELLED.

No.		Cancelled by.	No.
2131	Firth of Clyde	New chart. Arran island to Gare loch	2131
2132			
2174			
2133	Inchmarnoch water		
1351	Port Cadaques. Port Santa Cruz de la Selva. Rosas	New plans. Port Selva. Rosas bay. Port Cadaques	1615
1820	Andros	New chart. Andros island and Doro channel	1820
1136	Red bay	New plan. Red bay	1136
284	Plan of Blanc Sablon bay, on this chart	New plan. Blanc Sablon on	1631
1507	St. Joseph channel	New plans. St. Joseph channel. Wilson channel	1507
2012	San Juan de Nicaragua or Greytown	New plan. San Juan del Norte or Greytown	2012
2448	Approaches to Fitz Hugh and Smith sounds	New chart. Approaches to Fitz Hugh and Smith sounds	2448
772	Islands and reefs in the Caroline islands	New chart. Islands and reefs in the Caroline islands	772
773			
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445	m	=	5·3	Black sea:—Pyrgos or Burghaz bay, 2s.

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 108, England, east coast:—The Wash. 2307, Norway, west coast:—Smølen island to Sve fiord. 2308, Norway, west coast:—Brand fioni to Leko. 1733, Mediterranean:—Ponza islands. 392, West Indies:—Gulf of Mexico. 2431, North America, west coast:—Port Simpson to Cross sound. 457, Japan:—Aburatsubo harbour. 771, Japan:—Hancock bay. 2655, Japan:—Simoda harbour.

(*J. D. Potter, Agent.*)

United States Charts.—No. 1294, Abasco Anchorage and Vicinity. From a Survey in 1889-90 by the Officers of the U.S.S. *Ranger*, Lieut.-Commander G. O. C. Reiter, U.S.N. Commanding.—Pilot Chart of the North Atlantic Ocean. January, 1892. With a Supplement, "Instructions in Case of Shipwreck." Published at the Hydrographic Office, Bureau of Navigation, Navy Department, Washington, D.C. Richardson Clover, Lieut.-Commander, U.S.N., Hydrographer.

ATLASES.

Johnston, W. & A. K.—Royal Atlas of Modern Geography. Edition in monthly parts. Parts III. & IV. W. & A. K. Johnston, Edinburgh and London, 1892. Price 4s. 6d. each part. [Presented by the Publishers.]

Part III. contains maps of Denmark and the southern portion of the German Empire. On the former insets are given of Iceland, the Farø Islands, and Copenhagen; and on the latter plans of Frankfurt and Munich. Part IV. contains the northern sheet of a map of Scotland, on which the Shetland Islands are shown on an inset; and a map of European Russia, with an inset plan of St. Petersburg. Each of these maps is accompanied, at the time it is issued, by an excellent index.

Universal Atlas, The —, complete in 28 parts, including Index. London, published by Cassell & Co., Limited, for the Atlas Publishing Co., Limited. Part 10. Price 1s. [Presented by the Publishers.]

Sheet 67 is a map of European Russia, on which all the principal railways and canals are shown. The importance of the towns, as regards population, is indicated by a symbol, and the heights are given in English feet. Sheets 75 and 76 contain maps of Palestine and Persia, on the former of which the ancient as well as the modern names are given, and the sites of ruins, mosques, fountains, &c., are indicated.

PHOTOGRAPHS.

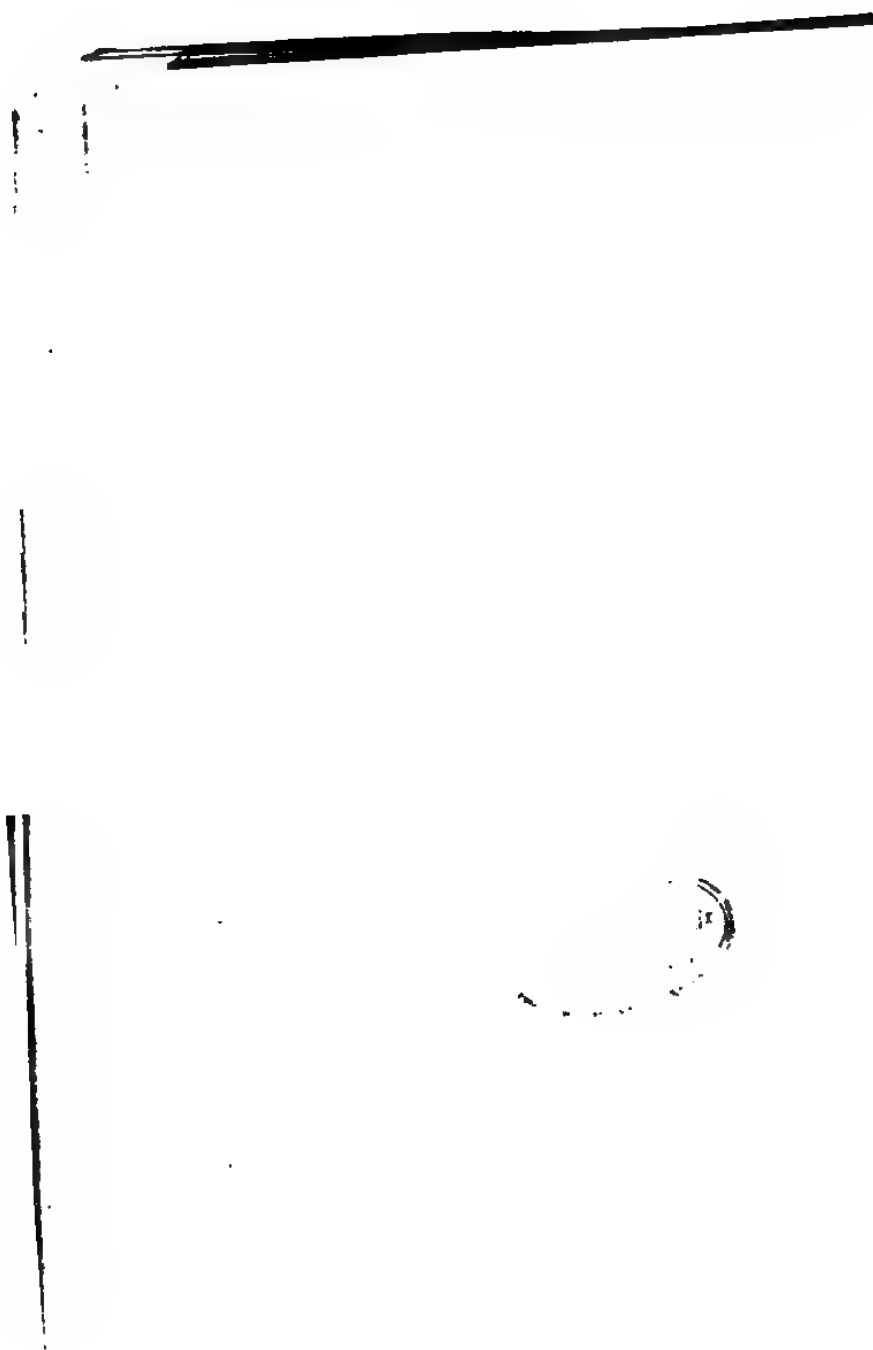
British East Africa.—Sixty-five Photographs of Masai Land, Victoria Nyanza, &c., taken by Mr. Ernest Gedge in 1889-90, and presented by him to the Royal Geographical Society.

This is a series of photographs taken by Mr. Ernest Gedge during his journey from the East Coast to Uganda. It contains some excellent views of scenery and natives, and is a valuable addition to the Society's collection.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given. In response to this notice many valuable photographs have been presented; the collection, however, is at present far from being complete, one of its greatest deficiencies being the entire absence of any photographs of Asia Minor.

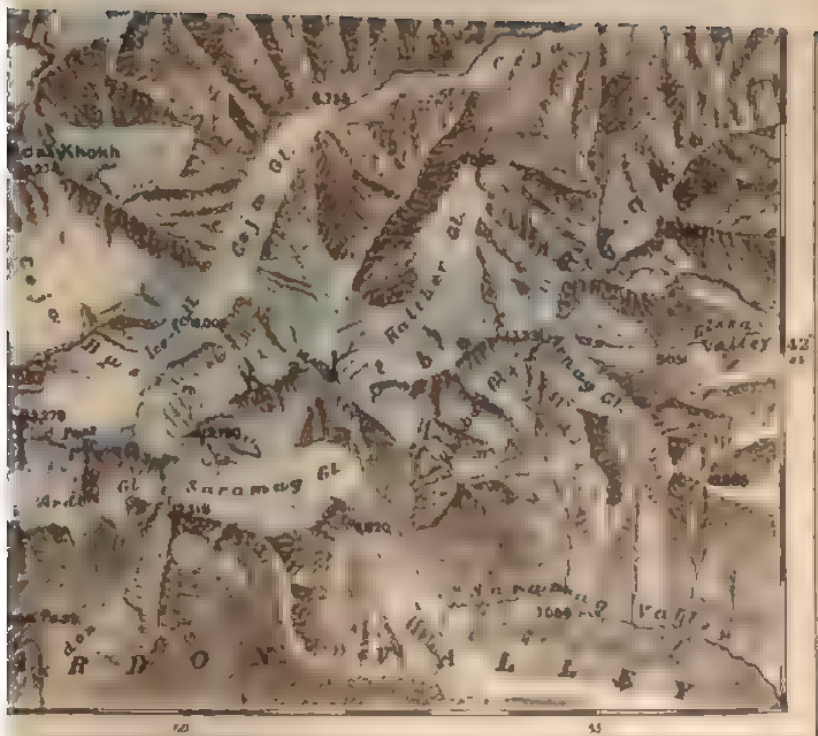


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PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

A Journey through North Korea to the Ch'ang-pai Shan.
By CHARLES W. CAMPBELL, H.M. Consular Service, China.

(Read at the Evening Meeting, January 25th, 1892.)

Map, p. 20t.

ONE of the first purchases I made in Korea after my arrival there in September 1887, was a native atlas which I saw displayed in a shop during one of my earliest walks in the City of Seoul. It was by no means the first map of Korea that I had seen, but it was the first to interest me, and my attention was instantly drawn to a mountain called "White Head Mountain," which figured very prominently at the top of it. It seemed to consist of a circle of jagged peaks enclosing a moderately-sized lake. Turning overleaf for some explanation of this extraordinary place I found a short description of it in Chinese, which I paraphrase as follows:—

"Peik-tu San, or White Head Mountain, lies seven or eight days journey to the west of Hoi-ryeng,* in Manchu territory. The mountain is in three tiers, is 200 li, or 60 miles, high, and the circuit of its base covers 1000 li, or 300 miles. On the summit there is a lake 800 li, or 250 miles, in circumference, whence flow the three rivers Yalu, Sungari, and Tumen."

Making every allowance for the usual exaggeration in such matters, this notice clearly referred to a very uncommon sort of mountain. At the time I was not aware that it had ever been seen by Europeans, and I at once resolved to visit it as soon as an opportunity presented itself. Later on I learnt that Mr. James and his party had explored it hurriedly in the summer of 1886 from the direction of Manchuria, being the first foreigners to do so; but I still thought the neighbourhood worthy of examination from the Korean side, and, needless to say, my own curiosity to see the lake so wonderfully situated was not lessened by Mr. James's graphic description of it in his book entitled 'The Long White Mountain.' It is true that the Korean stories of the dimensions

* A town on the Korean border.

of both lake and mountain were toned down greatly by Mr. James; nevertheless, lakes in mountain tops 7000 or 8000 feet above sea-level are rare enough, and this one on Peik-tu-San yields precedence in interest, historically and geographically, to few others in the world.

It was not until the autumn of 1889 that my duties permitted such a lengthened absence from my post as the journey I contemplated entailed, and even then I was unable to start as early in the season as I could have wished. Travelling in Korea is slow work at the best of times, and Peik-tu San was a good 600 miles away from Seoul, the capital, where I was then stationed. However, my equipment and following were kept within as narrow limits as possible to prevent the too common delays caused by want of accommodation in country villages, and to diminish the annoyance and worry of supervising animals and baggage. Korean pack ponies are hardy little stallions of ten hands or so, whose temper could bear improvement, while the *ma-pu*, or drivers, are astonishing adepts in the wiles of procrastination.

I left the east gate of Seoul at noon on the 31st August, and for four days followed the northern highway to Wen-san, passing through or near Yang-chu, P'o-ch'en, Keum-hoa, and Keum-seng. For the first 20 miles this road is a wide, sandy track, broken by numerous watercourses, but afterwards it rapidly dwindles into an uneven bridle-path which is rarely broad enough to allow two ponies to go abreast. As a rule it skirted the hills and kept to the lowest ground possible, so that the elevation was gentle and gradual throughout. At two or three points rough, forested ridges, were encountered, but nowhere during this four days' journey did the road rise more than 900 feet above the level of Seoul. I was struck by the prosperous, fruitful appearance of this part of the country. The harvest was approaching, and luxuriant crops of rice, millet, beans and buckwheat covered the valleys. Even the squalor and wretchedness of the straw-thatched huts, which are the dwellings of the vast majority of the peasants, were forgotten in the picturesque gardens of melon, chilli, tobacco, hemp, and sesamum surrounding them.

The country traversed was typical of the centre and south of the peninsula, and for that reason deserves a particular notice. As you are doubtless aware, Korea is a land of mountains. Go where you will a stretch of level road is rare, and a stretch of level plain rarer still. The view from any prominent height is always the same; the eye ranges over an expanse of hill-tops, now running in a succession of long, billowy lines, now broken up like the wavelets in a choppy sea, often green with forest, but just as often bare, brown, and forbidding. Clear mountain brooks or shallow streams rushing over beds of gravel are never wanting in the valleys below, where a rude log bridge, or curling smoke, or the presence of cultivation, leads you to observe the brown thatch of some huts clustered under the lee of a hill. These

hamlets are of two distinct kinds; the purely agricultural, and those which depend as much on the entertainment of travellers as on farming. The site of the agricultural village is a hill-slope facing the south. Over this low, mud-walled, straw-thatched hovels, each standing in its own patch of garden, which is protected by a neat fence of interlaced stems, are scattered at random, and there is not much attempt at a street anywhere. Every house has its threshing floor of beaten clay, the workshop of the family. The stream which runs past the foot of the hill, or courses down a gully in its side, is lined with women and girls washing clothes with sticks instead of soap, preparing cabbages for pickle, or steeping hemp. Seen from a distance these places are quite picturesque. The uneven terraces of thatch are brightened by the foliage and flowers of gourds and melons which climb all over the huts. In the gardens surrounding each house are plots of red chilli, rows of castor-oil plants, and fruit trees such as peach, apricot, pear, and persimmon.

The roadside village, on the other hand, is generally a most unlovely spot. The only street is the main highway, which is lined on both sides by a straggling collection of the huts I have mentioned. Heaps of refuse, open drains, malodorous pools, stacks of brushwood for fuel, nude sun-tanned children disporting themselves, men and women threshing grain, and occasionally a crowd of disputants, all combine to make it a very indifferent thoroughfare. Most of the houses are inns or eating-shops. The main gate of the inn leads directly from the street into a quadrangle bounded on two sides by open sheds, which are provided with troughs for the feeding of pack animals, and on the other two sides by the guest rooms and kitchen. The courtyard is untidy, often dominated by a powerful pig-stye, and littered with fodder or earthenware pitchers and vats, whose contents are usually the strong-smelling pickled cabbages and turnips so dear to Korean stomachs. I never had the courage to examine the kitchen closely. My food was cooked in the open air over a charcoal brazier and in my own utensils. One's room in an inn, I am thankful to say, is very simply furnished with a reed mat spread over the mud floor. Even with this slight cover the numbers and virulence of the vermin at times exceeded my wildest expectations.

The main industry, of course, is agriculture, carried on under disadvantages inseparable from the mountainous character of the country. In Japan and China we know that persevering care and energy have overcome similar disadvantages, but it is not so in Korea. The terraced cultivation, the irrigation works, and above all the patient, almost fastidious labour, which make the hills of Japan and South China yield their share of the earth's good fruits, are practically unknown. Where water is abundant and easily manageable the lower reaches of the valleys are utilised for rice, the higher portions for millet, beans,

buckwheat, &c. A particularly favourable slope, all the better if it faces the south, is usually as much as the sides of the valley are called upon to contribute to cultivation. There is considerable waste about the paths and paddy-dykes, weeds are rank and numerous, and the prim neatness so conspicuous in Japanese farming is entirely wanting. Much of the newly broken ground is naturally stony, and little effort is exercised to make it less so. However, considering the small amount of labour expended on agricultural operations, the crops are good and speak eloquently for the fertility of the soil. Setting aside the rice-fields, all good land in Central and South Korea is capable of bearing two crops a year—a winter crop of wheat or barley, followed by one of turnips, melons, or beans. At the commencement of my journey, and while everything was ripening fast, watch-sheds raised on poles to a height of 10 or 12 feet from the ground were erected at all points, and a night and day watch was maintained against thieves. Lest this should give a false impression of Korean honesty in the rural districts, I ought to add that these sheds are only held to be necessary near melon patches and fields adjoining the great highways.

The implements used in farming are wooden ploughs, short sharp-pointed hoes, reaping hooks, wooden harrows, and bamboo rakes. Besides these a peculiarly Korean article is used in breaking turf or similar heavy work; it is a huge shovel, wielded by three or five men, one guiding it by the long handle, while the others strain or jerk it on either side with ropes attached to the blade. Nowhere else would such an instrument be tolerated, for the whole band of men, who usually smoke their long cane pipes while at work, never accomplish their task a whit faster than it would be done by a single, earnest labourer in any other country. Rice is threshed by seizing a wisp in both hands and beating the grain out over a log or board; among the poorest people it is so precious that each head is taken separately and the ears scraped off with a knife. Other cereals, as well as beans and pulses, are dealt with by flails, the threshing-floor, as often as not, being the public road. Grain is winnowed by throwing it up in the wind, and hulled by means of stone querns and *pang-a*, or mortars. The latter are worked by hand, by foot, or by water. The hand *pang-a* is a wooden mortar—usually two feet of tree trunk hollowed at one end—in which the grain is pounded with a heavy iron or stone hammer. In the foot *pang-a* a heavy timber fitted with a wooden peg for a pestle is so balanced that a slight pressure raises the peg a few feet above the rough granite mortar, which is bedded in the ground to receive it. The *mul*, or water *pang-a*, is the same instrument, provided with a trough, into which a rivulet of water from the nearest stream is diverted; when full the trough descends, empties, and the pestle then falls with force on the grain beneath. Not uncommonly a dozen of these *mul-pang-a* may be seen worked by the same stream.

The principal farm animal is the ox: in mid Korea he is a splendid beast—hardy, tractable, and bearing a strong resemblance in build to our shorthorn stock. A cane or iron ring, for which his nostrils are pierced when young, suffices to control him, and he is early accustomed to his constant work of load carrying. Ploughing is done with the ox: rarely or never with the pony. Dairy produce is unknown, or nearly so. Draught cattle and ponies are fed on coarse fodder and a boiled slush of beans, chopped straw, and rice husks. The remaining domestic animals are black hairy pigs, wily gaunt creatures, and horribly loathsome; wolfish dogs, possessing a surprising nose for foreigners; and fowls that almost equal their wild congeners, the pheasants, in powers of flight and wariness.

But to return to my journey. On the fifth day I branched into untrodden country for the purpose of visiting a remarkable range, called the Keum Kang San, or Diamond Mountains, where the most notable collection of Buddhist monasteries in Korea is to be found. There was a considerable change in the configuration of the land as we progressed eastward from Keum-seng. The valleys contracted into narrow, rocky glens, forests of oak, pine, maple, and chestnut clothed the steeper and loftier slopes, and cover sufficiently thick to delight the heart of the sportsman abounded everywhere. On the morning of the sixth day we were stopped in a little village called Mari-kei by the news that a pass in front was too steep for laden animals. Bearers were, of course, the only alternative. The weather was very wet, and knowing the almost invincible dislike of Koreans to work under rain, I felt that a delay was inevitable. To make matters worse, the headman, upon whom I mainly relied for assistance in hiring the men I wanted, was absent, but his wife proved a capable substitute, and seemed to fill her husband's place with unquestioned authority. Between bullying and coaxing she rapidly pressed twenty reluctant men into my service. Poor fellows! they gave me the impression that they had yielded out of sheer inability to cope with the torrent of mingled blandishment and invective which she poured on them. The subjection of women, which is probably the commonest of accepted theories in the East, received a fresh blow in my mind, and the whole incident—it would take too much time to describe it at length—strengthened an opinion I have gradually acquired that women in these parts of the world, if the truth were known, fill a higher place and wield a far greater influence than they are usually credited with.

The pass we now crossed, known as the Tan-pa Ryong, is the western barrier of the Keum Kang region. The summit is about 2800 feet above sea-level. Thence in clear weather a view of the Diamond Mountains was said to be obtainable, and the name *Tan-pa*, which means "Crop-hair," was given to the ridge in the early days of Korean Buddhism to signify that those who once reached this point had

taken refuge in the cloister, and should sever their connection with the world by parting with their hair.

From Tan-pa Ryong a journey of 16 miles in a north-easterly direction brought us to Ch'ang-An Sa or Temple of Eternal Rest, a Buddhist monastery at the foot of the Keum Kang San (Diamond Mountains). These mountains are a remarkable section of the main range which practically determines the east coast of Korea. Elsewhere the aspect of the chain is tame enough, but in the north of the Kang-wen province it suddenly starts into a towering mass of irregular, precipitous rocks, whose appearance earned for them many centuries ago their present designation.* Viewed from the Eastern Sea, which is not more than 30 miles off as the crow flies, their serrated outline is very striking and must always make them conspicuous. The district they occupy is a fairly well defined one, some thirty miles long by twenty broad. Few places are more renowned in any country than these mountains are in Korea: in popular estimation they are the *beau idéal* of scenic loveliness, the perfection of wild beauty in nature. I found that both Chinese and Japanese spoke and wrote of them, but more because they are a Buddhistic centre than for any other reason. At Seoul a visit to Keum Kang San is quite fashionable, and supplies all the material necessary for reputation as a traveller.

Buddhism evidently found a home in these secluded mountains soon after its introduction into Korea, which Chinese and native records tell us occurred in the latter half of the fourth century after Christ. A Korean book—the "Keum Kang San Records"—states that Ch'ang-An Sa was restored or rebuilt at the beginning of the sixth century, and at the monastery itself tradition dates the oldest relics from the T'ang period (A.D. 618-907). At present upwards of 40 shrines, tended by 300 or 400 monks, a few nuns, and a host of lay servitors, are scattered over the east and west slopes of the Diamond Mountains. The great majority of the monks are congregated at the four chief monasteries, and the nuns possess a small sanctuary or two where they find sufficient to do, apart from religious exercises, in weaving cotton and hempen garments and other womanly occupations. The monks, when not in residence at the monasteries, travel all over the country alms-bowl in hand, chanting the canons of Buddha from door to door, soliciting subscriptions to the building of a new altar or for the repair of an old one, and begging from day to day the food and resting place which are rarely denied them.

I cannot say much for these exponents of Buddhism. Few of them know much of the religion or its history, and none could attempt to explain intelligibly the purport of the books they use at their services. These are carried through in the most perfunctory style, and with an utter absence of true devotion. The shrines are not lacking in the

* It is quite possible that the celebrated Diamond *sutra* may have furnished the origin of this name.

impressiveness characteristic of holy places, but the deluded existence, in most instances, led in monasteries is a constant topic among Koreans. The Buddhist monk, in their estimation, is a very low creature, whose morals are no better than his neighbour's, and whose life is usually the reverse of the pattern it ought to be.

The monastery buildings, shrines, and images are very similar to those found everywhere in China, and I shall not waste time describing them. As for the scenery of the Keum Kang San, I can thoroughly endorse the praises of the natives. My route followed a rough torrent winding up the west slope to the water-shed—which is 4200 feet above sea-level and the highest point reached by me in the journey across Korea—and descended the eastern flank by a wild mountain path. The monastery of Ch'ang-An is superbly situated a little way up the west slope. The lofty hills which wall in the torrent on the north recede for a few hundred yards, and rejoin it again, leaving in the interval a semi-circular space of level ground upon which the temple is built. Nothing could be more effective than the deep green setting of this half-circlet of hills rising up like a rampart from the rear of the buildings, and rendered additionally pleasing to the eye by a symmetrical covering of leafy forest and shrub. In front, the water swishes and swirls through rough, tumbled granite blocks, here and there softening into a clear pool, and beyond this again towers a conical buttress of the Keum Kang San, thickly clothed with pines and tangled undergrowth for half its height. This peak possesses the characteristics of the range. Gaping seams and cracks split it vertically from the summit down until vegetation hides the rock, at sufficiently regular intervals to give one the impression of looking at the pipes of an immense organ. The topmost ribs are almost perpendicular, and gleam bare and blue in the evening sun; but lower down the cracks and ledges afford a precarious lodging to a few conifers and stunted oaks. The whole forms a *coup-d'œil* of mountain, forest, and flood which it would be hard to match anywhere. The other monasteries be along the route I followed, and the situation of each is just as pretty as that which I have attempted to picture to you.

After crossing the Keum Kang range we soon struck the Japan Sea, and, turning north-west, a journey of 60 miles along the coast brought us to Wen-san, one of the ports opened to trade by Korea's treaties with foreign powers. This place has been mentioned and described elsewhere, so that there is no need to do so here. From Wen-san we followed the coast-line northward for six days, passing through a number of populous towns, including Yeng-heung, Cheng-p'yeng, Ham-heung, and Puk-oh'eng.

The shallow streams on the east coast, particularly those in the neighbourhood of Yeng-heung, are frequented yearly by salmon which are systematically trapped by the Koreans. At the time of my visit (17th September) the season was at its height, and good, well-conditioned

fish were cheap and plentiful; they were mostly netted or speared by torchlight. At Yeng-heung a 10 lb. salmon was considered dear at 2*d.* or 3*d.*

Ham-heung, the capital of the Ham-kyeng province, is a walled town of 25,000 or 30,000 inhabitants, and the most important in north-east Korea. It is situated on the north bank of the So-chin river, which is simply a torrent during the few weeks of rainy season, and a shallow unnavigable stream during the remainder of the year.

Trade, which was not active on the Seoul-Wen-san route, was particularly stirring along the east coast. It is mainly in Manchester cottons, as much as 100,000*l.* worth being imported at Wen-san during 1888. These mount the coast as far as, if not farther than, Kyeng-seng, which is nearly 200 miles north-east of Puk-ch'eng, and penetrate the interior, always in rapidly diminishing quantities, to the Yalu. It is interesting to note the progressive increase in prices caused by the cost of carriage: at Wen-san the Korean foot * of grey shirting is sold retail at 40 to 45 cash (2½*d.*), in Ham-heung at 50 cash (3*d.*), in Puk-ch'eng at 55 to 60 cash (3½*d.*), and in Kap-san at 70 to 75 cash (4½*d.*). The journey of 230 miles from Wen-san to Kap-san is thus seen to increase the cost of European cottons as much as 70 per cent. North of Kyeng-seng the small demand for foreign goods is supplied by Vladivostock. With a view to extend the influence of this market in North Korea, a Trade Convention was concluded in 1888 between the Russian and Korean Governments, and Kyeng-heung, a town on the Tumen close to the few miles of Russian frontier which are common with Korea, was declared open to Russian subjects. It was evidently hoped to create a market there after the style of Kiakhta and Maimaichin, but up to the present nothing of the sort has resulted. The basin of the Tumen is a poor country under present conditions, and the river itself is insignificant. That it forms the north-east boundary of Korea for almost its entire length is its chief claim to political consideration. Its commercial importance is of the slightest. Like all East Korean rivers, it is shallow, sandy, and channelless. Near the mouth it is probably a mile wide, including the sandbanks in the centre, but at Kyeng-heung, which is 30 miles from the sea, its width is no more than 200 or 300 yards. Up to Kyeng-heung only about two feet of water can be absolutely depended on, and the navigation is therefore limited to flat-bottomed boats, the largest of which are capable of floating five or six tons of timber. The farthest point on the Tumen to which boats of any sort ply is, I believe, 60 or 70 miles only from the coast.

Fairs were common between Wen-san and Puk-ch'eng, as indeed they are in all the populous districts of Korea. The road was always animated with a concourse of merry, brightly-dressed people, wending

* The "piece" of grey shirting (38 yards) measures from 62 to 63 Korean feet.

their way to the market town; squads of women carrying jars and baskets of melons, pears, chillies, &c., on their heads and babies on their backs; bulls and carts laden with brushwood for fuel; produce of all kinds, including grain and dried fish, borne by ponies and men; sturdy, half-nude coolies perspiring under lofty wooden frameworks, to which assortments of earthenware pots and turned wooden dishes are attached; and, more numerous than all, the pleasure-seeker or *ku-kyeng-kun*, in holiday dress, strutting along in company with a batch of friends, gesticulating, laughing, and cracking jokes productive of the most hilarious mirth. Such throngs greeted the foreigner with amused surprise, sometimes a trifle rudely, but always good-naturedly. The women in most cases behaved as properly conducted Korean women ought to do when their faces run the risk of being scanned by a stranger, and turned their backs on him; yet frequently all scruples vanished before an overpowering curiosity to take in the particulars of so odd a costume, or to discuss the singularity of the equipage.

The main street of the town or village is the market place. It often widens into a sort of place or square, where straw booths are hastily erected for the occasion; but ordinarily each man exposes his wares on some boards, or on a cloth spread on the ground in the best spot available. The articles for sale are of the simplest; fruit, such as melons, peaches, apricots, and nectarines; tobacco in long, wrinkled, unpressed leaves; fresh salmon and dried fish; barley, rice of many qualities, beans, and pulse exposed in trays of straw matting, or packed in straw bags; charcoal in tiny bundles at a cash each; cast-iron pots and boilers, whose only merit is cheapness; wicker-ware in the shape of neat baskets, trays, and panniers; silver rings, hair-pins, and other trinkets of no particular excellence; straw sandals and hempen shoes; and hats in a variety of shapes which defy a short description.

Foreign goods were exposed in booths six or eight feet square. The walls of these diminutive establishments were draped with grey shirtings, Victoria lawns, and cheap towels, mingled with native cottons and grass-cloth. The proprietor squats Turkish fashion on the boarded floor, and around him, within easy reach, is a miscellaneous collection of needles, Japanese matches, mirrors, Prussian blue in card boxes, and aniline dyes in bottles, cheap knives, santolin lozenges (these, the dyes and needles are of German origin), ribbons and braid, brass pipe-bowls and mouth-pieces of native make, and long cane stems for pipes. A sign of the advancing times is occasionally seen in cigarettes, and lacquered holders of Japanese manufacture, and cheap foreign soaps. A bale or two of Manchester goods completes a stock which might be bought outright for 2*l*. or 3*l*.

FROM THE EAST COAST TO PEIK-TU SAN.

At Puk-ch'eng I was obliged to make a radical decision as to my future movements. There were two possible routes to Peik-tu San—one via Kil-chu and Mu-san, usually taken by the Korean frontier Commissions, and the other leading directly north through Kap-san. With more time at my disposal I should have taken the former, which is much the more interesting, but the advancing autumn and other considerations forced me to adopt the direct road.

On the 23rd September, then, we struck inland and following the Puk-ch'eng river to its source, next day reached the crest of the range which here fringes the highlands of North Korea. The top of the pass, called Hu-ch'i Hyeng, is 4300 feet above the sea: thence to the Yalu at Hyei-san, a distance of 100 miles, there was a gradual descent, with one remarkable irregularity, to an elevation of 2800 feet. The aspect of the country had completely changed. We had left warm valleys producing rice and cotton, and had entered a plateau-like region, where these crops were impossible, their places being taken by oats, millet, and hemp. At first our way lay through a forest of spruce, pine, birch, and oak, broken by an occasional marshy glade: to this succeeded an undulating country, which bore traces of being recently cleared. Clearings were made simply by setting fire to the forest, a process which I saw in operation. The population was scanty, but evidently increasing. The houses were log-huts plastered with clay, roofed with thatch or shingle, and fenced with palisades of stakes six or eight feet high. Game hereabouts was very plentiful. At Chang-ka Ch'am I flushed scores of pheasants within a few minutes' walk of the village. On my return journey I saw half-a-dozen men making very good bags of quail by hawking, and according to the Koreans, wild pig, hare, and deer were numerous. Tigers, leopards, and bears are also said to be easily obtainable. The tiger, indeed, is a fruitful subject of discussion. From Wen-san to Peik-tu San, and thence to Peng-yang, I heard endless stories of the brute's ravages, and more than once I was asked to delay my journey to shoot a "man-eater." In the Yalu backwoods I passed through a deserted clearing, where four out of a total of ten inhabitants had become the prey of a man-eating tiger during the previous winter and spring.

Nearing Kap-san, which is four days' journey north of Puk-ch'eng, large tracts of cultivated land became common. The country about Kap san, and further on up to the Yalu, is long settled and comparatively populous, but miserably poor. Kap-san itself, the largest town in this region, is a collection of 300 or 400 houses, inclosed by an apology for a wall, which is crumbling where it has not already fallen. The neighbourhood is said to contain most of the mineral wealth of Korea; gold, silver, lead, and copper are worked at several places near at hand, but with sorry appliances and little skill.

The mineral wealth of Korea is the subject of diverse opinions among those most competent to judge. There is no doubt that the country is rich in useful and valuable minerals: the question is whether or not they can be worked at a profit, and on this largely depends the future commercial importance of Korea. Under existing circumstances, the question can only be solved by Western capital, and several efforts have been made by foreigners to do so, but the Korean Government is very averse at present to yielding the privileges which are reasonably necessary for a proper and profitable exploitation of the mines.

Gold is popularly supposed to exist everywhere in the peninsula. Few attempts are made to work quartz veins, but "placer" mining is carried on extensively. In the course of my wanderings I visited or passed by at least half-a-dozen washings, none of which were very prolific, owing, I believe, to the utter want of pumping appliances. The water has only to overcome the baling capacity of a couple of pails and the "claim" is deserted, the deeper and presumably richer deposits being left untouched. Nowhere did I come across an instance of the "bed-rock" being reached. Of other minerals I can say little. Coal has been reported from two or three localities. I paid a flying visit to one of them near Peng-yang and was much struck by the extent and breadth of the seam. A competent engineer has pronounced very favourably on this mine, and nothing but the jealousy or suspicion of the native authorities prevents it from being worked to advantage.

Some 30 miles north of Kap-san the crest of the ridge overlooking the Yalu was reached, and from it we got our first view of the famous Peik-tu San (White Head Mountain). Its renown was at once comprehensible, for distant as it was, the view was majestic. The white irregular mass towered, without any marked or prominent peak, head and shoulders over the surrounding hills, though one could see that it was not lofty as mountains go. To my great grief the glass revealed that, whatever might be the cause of its colour at other times, the whiteness was then due to snow which some Chinese I met told me had fallen less than a week previously. Just at the point where this mountain is first visible a small temple has been erected for the purpose of offering sacrifices—which is done by the King of Korea every year on the 4th of the 8th moon (August)—to the Peik-tu San deities. At Seoul I was led to believe that the officials deputed to perform this function actually ascended the mountain, but they evidently prefer a compromise, the efficacy of which has apparently never been doubted.

Below the ridge lay Hyei-san, a small military post which I had been told was the last abode of men in this direction. I discovered, however, that there was another station called Po-ch'en, 15 miles north-east of Hyei-san, and thither I induced my pony drivers to carry my belongings. At Hyei-san the Yalu river is a rapid stream some

40 or 50 yards wide, flowing for the most part between steep, wooded banks, but shallow enough to allow bull-sleds to ford it. There were no boats; a few "dug-outs" only were kept at different points to ferry foot-passengers. It is as well to mention here that according to my information, Mao-êrh Shan,* a town on the Chinese bank, is the highest navigable point on the river.

At Po-ch'en I at last made the acquaintance of a hunter who had ascended the White Head Mountain, and with his help I hired guides and bearers whose chief duty was to carry their own provisions. The expedition at ordinary times would only take ten or twelve days, but the season was late, and precautions in the shape of food had to be taken against snow which I was told fell so heavily in October as to make travelling impossible for days together. The journey can only be made on foot, though ponies and bulls are employed by the hunters—speed is never an object to them—to carry small compact loads everywhere through the forest.

Starting on October 1st from Po-ch'en we soon struck into the dense forest of fir, pine, larch, oak, and poplar, which extends with a few intermissions of open ground all the way to Peik-tu San. We followed the tortuous paths taken by the hunters in search of deer and sable, and as a consequence were continually crossing and re-crossing streams, making long detours to avoid fallen trunks, and winding among the trees, absolutely regardless of the points of the compass, and exactly as the pioneers of the route had blazed the way. Twenty miles north of Po-ch'en we passed the last settler's hut, and for the week following we were dependent for shelter on hunters' lodges whose owners had deserted them for the winter. Unfortunately the weather took a most unfavourable turn at this time; rain was succeeded by sleet and sleet by snow, which fell so heavily and continuously that the Korean guides more than once urged me to give up my project. On the 5th October we forded the Yalu in the midst of a blinding snowstorm, and crossed into Chinese Manchuria. Here we were lucky enough to meet a Korean, a trapper of sable, who volunteered to show us a short cut to Peik-tu San which would save us a good day's journey. Next morning, then, he led us northward along the Manchurian side of the Yalu, over ground so difficult that we had much more clambering to do than walking. We soon reached the junction of the two streams which here unite to form the Yalu, and following the western and smaller one to its source we ascended rapidly into an open valley covered with deep snow.

Our volunteer guide left us at this point, and we floundered on to the top of the Tei-mun Ryeng (Great Gate Range or Pass), which divides

* In the spelling of Korean names of places the orthography recommended by the Society is followed. However, in China Sir Thomas Wade's system of transliteration has taken such root, and is used so universally, that I have followed it in the one or two instances where Chinese place-names occur.

the Yalu from the Sungari basin. To the north-east a great brown forest stretched as far as the eye could reach, at some 2000 feet below us; our elevation on the Tei-mun Ryeng was 6200 feet. Just opposite, on the north and north-west, was the White Head Mountain. The day had cleared wonderfully; the clouds, which rarely desert the summit at this season, possibly because of the lake, had disappeared, and we got our only good look at this hoary ancestor of the Ch'ang-pai Shan. The near view was not striking; a short four miles, as the crow flies, separated us from the crest. We were scarcely more than 2000 feet below the level of the jagged peaks that mark the position of the lake, so that the massiveness of the mountain as seen from a distance was not apparent.

The snow on the Tei-mun Ryeng was a foot and a half deep, and we had still some 20 li, or 6 miles, to cover in the three remaining hours of daylight. Blazed trees and broken twigs showed us the way down the valley, across a feeder of the Sungari, and on up the opposite slope to a hunter's hut, whose last occupant, I learnt afterwards, had been devoured by a tiger during the previous winter. Our destination was hardly more than two or three miles from this hut, so the guides pushed on, but only to find themselves thoroughly at fault. We kept on for two hours ascending always in the hope of crossing a trail, when finally the oldest guide—in fact the only one who could pretend to know the neighbourhood—fell in a fit. Night was closing in rapidly, so we camped where he fell round a huge fire of logs. His illness was, no doubt, due to hysteria brought on by over-exertion, but the superstitious Koreans attributed his paroxysms to the malevolent *san-shin*, or mountain genii. All my men spent half the night offering prayers and propitiatory sacrifices of rice to the offended deities, while I doctored the poor man with Liebig's extract. By morning he had recovered somewhat under my ministrations, but the rest of the party joined with him in objecting to any further advances, and though I might have overcome their opposition, I felt that I was subjecting them to considerable risks by delaying in such a remote place, at such a season, with only a week or ten days' food in store. We returned the way we came. I may mention that the hut I should have reached but for this accident was the Tang-shan where Messrs. James, Fulford, and Younghusband stayed during their visit to the mountain in 1886.

Peik-tu San, or Lao-pai Shan (Old White Mountain) as it is at present called by the Chinese of Manchuria, is the most remarkable mountain, naturally and historically, in this part of Asia. The perennial whiteness of its crest, now known to be caused by pumice when not by snow, made the peoples that beheld it from the plains of Manchuria give it names whose meanings have survived in the Chinese *Ch'ang-pai Shan*, or Ever White Mountain. This designation, obviously assigned to the White Mountain alone, has been extended to the whole range without apparent reason, for no other peak of it, so far as is known, can pretend to per-

petual whiteness, whether of pumice or snow. Some 100 miles south-east of Peik-tu San there is a Oh'ang-peik San (Ever White Mountain) which must approach, if it does not exceed, the White Mountain in height; but the Koreans do not credit it with a snowy covering for more than nine months of the year, and a European traveller who has seen it informs me that it is wooded to the summit, quite unlike Peik-tu San, which is bare of forest for the last 1000 feet of its height. The great point of interest in the mountain, apart from its whiteness, is the lake—12 miles in circuit according to Mr. James and his party, the only Europeans who have seen it—which lies in the broad top of the mountain at a height of 7500 feet above sea level, and is supposed to be the source of the three rivers Yalu, Tumen, and Sungari. The *Tai Tai-ki* (Great Lake), as the Koreans call it, is the nucleus of a mass of legend and fable. It is a sacred spot, the abode of beings supernatural, and not to be profaned by mortal eye with impunity. Curiously enough, neither Chinese nor Koreans have the faintest notion of the real character of Peik-tu San. The Chinese say that the lake is an "eye of the sea," and the Koreans tell you that the rock of which the mountain is composed floats in water, for lumps of pumice were common on the Yalu at Hyei-san. My crude geological explanations, that this *cho-san* (ancestral mountain) of Korea was a burnt-out volcano, whose crater had been filled with water by springs, were listened to with polite wonder and treated with much less credulity than they deserved. I pointed to the black dust, to the clinkers, and to the rocks lining the banks of the Yalu for miles, many of which looked as if they had been freshly ejected from some subterranean furnace, but to no purpose. If the occurrences I spoke of had taken place they must have been handed down by tradition, and it was useless to cite lapse of time—Koreans are ignorant of geological periods—to people whose history extends as far back as 4000 years ago.

According to my observation, most of the forest between Po-ch'en and Peik-tu San grows on volcanic matter, which was without doubt ejected from Peik-tu San during successive eruptions. The general inferiority of the timber hereabouts to that which I saw elsewhere in Korea led me to examine the soil wherever an uprooted tree or a freshly-dug deer-pit furnished the opportunity. Beyond a thin coating of leaf-mould on the surface, there was seldom anything else but pumice, broken to the size of a very coarse sand. According to the hunters, this was the subsoil everywhere in the forest, and to my knowledge it extends for 40 miles at least to the south from Peik-tu San. Nearing the mountain we get the clearest evidence of the character and recency, geologically speaking, of the eruptions which spread this vast quantity of volcanic material over such a wide area. Ten miles due south of the White Mountain, the Yalu, now eight or 10 yards broad and very shallow, flows between banks like a railway cutting,

sheer, clean, and absolutely devoid of vegetation, for denudation was too rapid to permit the slightest growth. The sections thus exposed were often over 100 feet in depth, and at one of the deepest portions I counted thirteen layers of black, volcanic dust, all varying in thickness, and each separated from the layer above by a thin stratum of light-coloured mould. So fine was this dust that the least breath of wind caught it and scattered it freely over the adjoining snow, to which it gave a grimy, sooty appearance.

The forests of South Manchuria, though uninhabited now, were, we learn from Chinese records, the home of many races in ages past. The comparatively recent kingdom of Ko-ku-rye, which arose in the first century A.C., is said to have occupied the Ch'ang-pai Shan and the head waters of the Yalu river. Anyone who has travelled through the forests might be inclined to doubt such records, for, excepting hunters' lodges, one never notices a vestige of human occupation. But it must be remembered, on the other hand, that the word *kuk* (Chinese *kuo*), country or kingdom, was applied in the early history of Korea and Manchuria to very limited communities, often to mere villages. The word "tribe" better expresses what the so-called kingdoms actually were; and when we bear in mind their low civilisation and the temporary character of their dwellings, it is not surprising that my hasty journey failed to throw any light on the ancient inhabitants of these forests. Since my return, however, I was informed by Mr. Fulford that Chinese hunters told him of the discovery by them of human implements—of what kind I cannot say—when digging deer-pits near the White Mountain.

Mr. James, in a paper read before this Society in June 1887, described very fully the guild of hunters which practically owns and rules the forests to the north and west of Peik-tu San. The Koreans have no such guild probably because they have not so much to fear from bandits, but each hunter has a recognised right of ownership over a rudely defined district in the neighbourhood of his hut. Over this he hunts and traps deer in summer, and sable at the beginning of winter, altogether spending about five months of the year in the forest; the remaining seven are passed at his home on or near the Yalu, either tilling his ground or living in idleness on the proceeds of hunting seasons. Besides sable and deer, tiger, leopard, bear, pig, and ermine are found here: bear, probably the common brown species (*Ursus arctos*), are said by the hunters to be very numerous in summer. In mid-Korea I have seen a small black bear with a white patch on his chest (*Ursus tibetanus*), but the Yalu trappers did not seem to know it. Hazel-grouse were the only game-birds I noticed. Throughout the forests insect pests abound in the summer months. Mosquitoes, gnats, and gadflies make the lives of the settlers perfectly burdensome for two or three months of the year, and ponies and bulls quickly succumb

to their attacks. The houses are kept constantly filled with birch-smoke to drive them off; cattle are protected by fires of green wood in the open; and men working the clearings carry coils of rope made from dried *artemisia*, which burns slowly and emits a pungent odour, for the same purpose.

PEIK-TU SAN TO SEUL.

My original intention was to descend the Yalu to Ei-chu, and thence to return to Seoul via Peng-yang, but I relinquished this on learning from the Koreans that I could not follow the river either on land or by boat from Hu-chu to Cha-seng. On reaching Sam-su-whither I went from Po-ch'en to make inquiries, I found nobody willing to assist me in crossing the mountains direct to Cha-seng. The distance was only 140 miles, but the road was said to be exceptionally difficult, and there were no inhabitants or post-stations. The only alternative offered was a route via Kang-kyei and Wi-wen which I wanted to avoid, because it had already been explored in 1884 by Mr. Carles.

Turning southward to Kap-san I there made up my mind to attempt the, by all accounts, very inhospitable journey to Chang-chin and Peng-yang across the watershed of the Tei-tong and Yalu. Unfortunately I was attacked outside Kap-san by an unruly mob of roystering Koreans, while I was trying to rescue my servant from their clutches. The local magistrate helped me to arrest my principal assailants, and promised to send them to the Governor of the province for punishment. I strongly suspected that he would let those ruffians off as soon as my back was turned, a suspicion shared by my retinue, who told me that he was a very timid sort of official, and to make certain that this should not occur, I felt it my duty to return to Ham-heung. Here I saw the Governor of the province, whom I had known as Minister of Foreign Affairs at Seoul, and from him received assurances that he would deal severely with the Kap-san rowdies. In effect, I learnt afterwards that heavy punishments were inflicted on three of the ringleaders. I confess that it went sorely against my will to deviate from my journey and take all this trouble over the matter; nevertheless I owed some consideration to future travellers who might be treated as I was, unless strong measures were taken to show the people that foreigners were not to be ill-used with impunity.

From Ham-heung we had to return on our old route almost to Kowon before we could strike into the road leading across the peninsula to Peng-yang. There is very little to say about the latter. Two days were spent in re-crossing the mountain axis of Korea. The highest pass encountered, called the Ke-rin Ryeng, was hardly more than 8000 feet above sea-level. There was absolutely no traffic on this part of the road, very few inhabitants, and, consequently, little cultivation. The mountains, too, were bare of forest timber, being for the most part

covered with a "chapparal" of stunted oaks and chestnuts, now (October 25th) browned and withered by frost. Before entering the village of Orekei we joined the Peng-yang-Wen-san highway, which was a vast improvement on the miserable bridlepath we had followed over the mountains. From here to Peng-yang the traffic was brisk and continuous; long lines of pack-ponies going westward, laden with foreign goods, chiefly cotton shirtings, and sea-weed, were met by small consignments of tobacco and cowhides bound for Wen-san.

On the 29th October we reached Peng-yang, thus ending our journey westward. This city and the road between it and Seul are beaten ground, and I have little to add to what has previously been said about them. Peng-yang, with its large population of probably 100,000, impressed me more favourably, from a commercial point of view, than any other place I had visited in North Korea. It is situated in the midst of a rich agricultural region, within easy distance of important gold washings and coal deposits, and its river, the Tei-tong, is navigable to ships of moderate burthen to within 15 miles of the city. At Peng-yang itself the river is fully 200 yards broad and 20 feet deep, but a few miles below it shallows so much at one or two points that even the native junks are compelled to wait for favourable tides to ascend or descend. Trade is brisk at Peng-yang. The quantity of foreign goods, chiefly Manchester cottons, exposed for sale was very large. All foreign articles come from Wen-san or Chemulpo, Peng-yang, unfortunately, not being a treaty port. Were the place open directly to foreign trade, there is every reason to believe that a great extension of markets would result.

My journey ended at Seul on the 6th November, having lasted sixty-eight days, and covered 1300 miles. In the course of it, with the exception of very few instances, I was treated with the utmost civility and kindness by people and officials alike. Of course I aroused curiosity, and those who know what far-Eastern curiosity is, will appreciate how tiresome it becomes, especially if the traveller happens to be an amateur photographer. To make matters worse in my case, much of the route I took had never been travelled by Europeans, and I can assure you the inhabitants made the most of their first "ocean-man." However, of the hospitality of the Koreans, such as it is, I cannot speak too highly, particularly if the traveller takes pains to announce, as I always did, that he is prepared to pay cash for everything he wants.

The following discussion ensued :—

Captain YOUNGHURAND (Gold Medallist): It was in the summer of 1886 that Mr. James, a member of the Bombay Civil Service, with Dr. Fulford and myself, journeyed from Peking towards Manchuria, having heard of this Mount Peik-tu-San, of which we have had such an interesting account this evening from Mr. Campbell. We journeyed through the forests of Manchuria until we reached Mao-Erh Shan on the Yalu river, intending to make our way up the Yalu, over this range and down the

Tumen river to Hunchuan, close to Pusslet Bay. However, we found we could not get up this river Yalu, as Mr. Campbell has just told us he could not get down it; the fact being, that the whole valley is enclosed between very high cliffs which render the road perfectly impassable, and so we turned off north, keeping on still through the forests across this range, till we arrived in the basin of the Sungari river. We had the good fortune to be travelling in the months June and July, the only season at all practicable for exploring these forests of Manchuria. The season at which Mr. Campbell travelled was, unfortunately, the month of October, when there is a great deal of snow, which renders it perfectly impossible to get through the forests on the higher ridges. We were more fortunate when we heard of the road leading up to Ch'ang-pai Shan, as the mountain is called on the other side. It was impossible, however, to take the mules on which we carried the baggage, so we carried our luggage on our backs—Mr. James, Mr. Fulford, and myself—and we had with us a man and a boy to carry the supplies for ten days; in this manner we made our way through the bogs and forests which cover the country up to the mountain. At the foot of it we found some most lovely meadows covered with iris, lilies, and columbines, surpassing even those of Kashmir. Passing on up through the forest we came to the summit of the Ch'ang-pai Shan. Before us were two prominent peaks seen from the north side—there are really five all round—and between them the saddle. Arriving there, we expected to see a view on the other side towards Korea; instead of that, however, we saw straight under our feet this wonderful lake situated right at the top of the mountain. It was of the most clear deep blue, and surrounded by a magnificent circle of jagged peaks, ascending one of which I got a view of all this country over which Mr. Campbell travelled later on. We saw through the forests the course of this Yalu river and the Tumen river, which both rise on the spurs of this mountain, and out of this lake flowed a small stream which eventually runs into the Sungari, perhaps the most important tributary of the great Amur river which flows along the southern edge of Siberia. This Sungari river, although not equal in length to the Amur, has a considerably greater volume of water in it at its junction with that river. The whole of this country shows signs of volcanic origin. There is no doubt that this mountain Peak-tu San was formerly a volcano, and that this lake is in the crater of the volcano. Further north, near a place called Ninguta, we saw a plain of lava several miles in extent. Mr. Campbell has also mentioned that he found signs of volcanic action about here, so that the whole of this region is evidently of volcanic origin. Later on we journeyed back and arrived on the Tumen river, which was supposed to be of considerable volume, but when we came across it near its mouth we found it only a few feet deep, and quite unnavigable. I may mention that all this country was formerly part of Korea, for we frequently came across signs of ancient Korean habitations, one trace being the strawberries. I remember very well in the middle of the forest coming across a fine bed of strawberries, not so big as our English strawberries, but a great deal larger than our wild kind, and the Chinese settlers informed us that these were the remains of ancient gardens made by the Koreans in former times. I remember, also, further up in the forest of Manchuria we met some French Roman Catholic missionaries, who showed us some old pottery and some old coins which had been found by some of the settlers in a part of the forest they were clearing, thus showing it was more inhabited in former times than now. At present the only inhabitants one meets with are the sable-hunters and men who come to these parts to seek for gen-sing, a root upon which the Chinese set considerable value, and which is occasionally seen growing wild in the forest. The roots are set apart in the middle of the forest, with a clearing round, and although of much value to these men, they are never stolen. They are marked and allowed to remain there

perhaps for a year or two until they have grown bigger, and the men who found them are perfectly certain they would never be stolen by others passing that way. This is on account of the good rule which has been established there by the gulls, of which Mr. Campbell made mention. The gen-sing hunters and sable hunters form themselves into a guild for their mutual protection, and they hardly acknowledge any authority from the Chinese officials who reside in the more populated parts further north. But we certainly found travelling in this wild part of the forest infinitely safer under the protection of these guilds than it was in the more settled parts of Manchuria where the Chinese officials claim jurisdiction. I have only to add that I have been extremely interested in hearing Mr. Campbell's excellent account of his journey up to this White Mountain.

Mr. CARLES: The country travelled by my friend Mr. Campbell is, in a large measure, ground not trodden before by foreigners. I think I may say that from the point where he left the coast, up to the mount Peik-tu San, no Englishman has certainly travelled before; there have been persons who are not Koreans who have travelled there. A party of Japanese whom I met some years since were working their way up from Kichu to the south of Peik-tu San, but were driven back by snow, like Dr. Gottsche, who endeavoured to reach it from the south-west. No Englishman before Mr. Campbell has touched Peik-tu San on the south. Mr. Campbell has referred briefly to the interesting monasteries which he met at the Diamond Mountains, the Keum Kang San. These monasteries, which are all Buddhist, were founded by those who were driven to these lovely retreats by the persecutions of the Korean Government; for centuries Buddhism has been under a ban, and the Buddhists have followed the bent of Korean character in selecting the most beautiful retreats for the study of their religion. These monasteries form hotels for those travellers in the country who take their delight in leaving town life, taking simple food, and travelling day after day piping their way on the roads, rejoicing in the beauty of the country. I should think in hardly any country in the world the ordinary rustic takes so much delight in Nature as in Korea; when he goes with you up the mountains, and on arriving at the top you expect him to sigh as if nearly dead, he will expatiate on the beauty of the scene before him. In this love of scenery, as in many other points, the Korean differs greatly from his neighbours the Chinese.

In China and Japan you will find the coasts frequented by fleets of junks in every direction. In Korea maritime commerce hardly exists. It is true Korea is singularly unfortunate. On the west coast, where there are numerous inlets, the tides are very violent, rising 40 feet sometimes, and exposing shipping to very great danger, for a boat may be left high and dry 25 miles distant from the point aimed at; on the east coast, where there are no tides, there are no harbours, with the exception of Wen-san, and that is not a good one. Again, the harbours on the west coast are frozen up during the winter; it is only on the south coast, really, that navigation has been able to exist, and at the mouth of the Nak-tong river. Among these numerous islands which line the coast there has always been a considerable amount of trade over sea and a certain amount of piracy. The Japanese hold a strong position there.

Mr. Campbell referred to the existence of salmon at Yeng-heung. It is an interesting question as to whether this is found on the west coast. Salmon trout, or something very much like it, are found in those waters, but the salmon, I believe, is not found on the west coast of the country.

There is one product of Korea which I can commend to the notice of this Society. I am constantly distressed when I receive its valuable publications, because its maps, which are so valuable, are torn by my clumsy fingers. The Korean paper is such that it may be folded up time after time by the clumsiest fingers, with absolute

certainly that not one portion will be torn. Not only in Korea, but in Japan, does one find this paper, which I earnestly recommend to the attention of this Society.

Mr. BECKER: I beg to state, to begin with, that I have not travelled very much in Korea, having spent only some eight months there, and my only plea for adding anything to what these gentlemen have said is, that I looked at the country from a different point of view to theirs. I, being a miner, looked at the mineral wealth, and as this interests many people, I might make a few remarks on the subject.

Mr. Campbell, who has read this interesting paper, Mr. Carles, and others, have travelled far more and know more of the general features of the country. I am sure the paper has been very interesting to every one present, and to no one more than to those who have had some experience of the country—one, perhaps, even stranger than its neighbours China and Japan, having had such an ancient civilisation, and been secluded for so long a time.

Mr. Campbell made a slight allusion to the mineral wealth of Korea. Like most others only slightly known, and many well known countries, unfortunately the general belief in its mineral wealth was greatly exaggerated, and this opinion was formed, I believe, from the imports of gold to China and Japan which were made from Korea. Further, when in the year 1883 foreigners first flocked to Korea with the idea that it was a country worth exploiting, and saw brilliant minerals, ores of copper, lead, silver, and iron, they believed there was great mineral wealth in the country. It is always a very thankless task to say anything to the contrary, but I think others besides myself, notably Dr. Gotteche, also came to the conclusion that this was not the case. The mines have been known to the natives of the country, as in all these countries which have been not only populated, but highly civilised for thousands of years, and the processes by which they extract the metals are highly interesting to metallurgists as antiquities, but are otherwise of very little importance. Gold is undoubtedly widely distributed, especially in the north, but the very fact of this distribution of gold is only a proof, as Baron Von Richthofen told us, in analogous circumstances in China, of the poverty of the country. People go to work to get a very few grains of gold in places where the country is so sterile that they cannot make more at other occupations; therefore this wide distribution and production must not be taken to indicate a real abundance of its occurrence. Of other minerals, coal is said to occur chiefly in the north, and it is really strange that the Koreans have not earlier discovered the value of the coal deposits, as the Chinese and the Japanese have done, and adapted it to domestic purposes. I have not seen the coal, but others who have seen it say it is not of very excellent quality. It is hardly likely that Korean coal can compete with that of China and Japan whose deposits are known to be vast, and of excellent quality.

Gold will no doubt be discovered and exploited to a far greater extent than it is at present by the natives; but as Mr. Campbell has said, the jealousy and suspicion of the natives is the greatest obstruction. In my own case I had passports from the highest officials, which secured for me the greatest comfort in the principal towns and inns, but they were ignored by the privileged miners, who considered they had a prescriptive right to the gold of the districts in which they were engaged.

I think there is no use in my adding anything further on this subject of minerals. Mr. Campbell, beside giving us a vivid picture of the scenery of the country, has shown some most interesting pictures of native dresses and houses, the quaintness of which is very striking, and many present may have noticed the curious native hats. I think Korea must be the country where hats were first invented, although not originally to protect the head, but to cover the peculiar head dresses of the people from damage; they are made like birdcages of horse hair.

The costume too, is quaint in the extreme, both men and women dress in white, and an assembly of Koreans looks in the distance like a flock of swans. Once when at Wen-san harbour in the winter, I saw a lot of white objects surrounding the bay, which I took to be men, but on approaching I found they were really thousands of swans.

The PRESIDENT: Mr. Campbell is, I think, to be congratulated, not only upon having drawn up a very interesting paper, but also upon having initiated a very interesting discussion. If he did not succeed in reaching the top of the great White Mountain, he certainly did succeed in traversing a large extent of country which had been visited by no European, and he also succeeded in giving to the members of the Geographical Society a very agreeable evening. I do not think we can do less than thank him very cordially, and trust that he may have many further opportunities of adding to his knowledge, and, I hope, of communicating the knowledge which he has acquired, to this Society.

Mr. CAMPBELL returned thanks.

*Expeditions among the Kachin Tribes on the North-east Frontier of
Upper Burma.*

Compiled by General J. T. WALKER, C.B., F.R.S., from the Reports of
Lieutenant ELLIOTT, Assistant Commissioner.

Map, p. 204.

THE annexation of Burma has necessitated the geographical exploration of large areas of country which had never previously been visited by Europeans, and of which our knowledge has been generally of a very vague description, and frequently none at all. They are mostly inhabited by tribes of independent races who were never brought under the government of the native rulers of Burma, and who paid allegiance only to such of their own chieftains as were strong enough to make their power felt and acknowledged. Frequently marauding parties issue from these regions into the districts which have come under the administration of the British Government, and then of course tributary expeditions have to be carried into their country, each of which usually furnishes its quota of new geographical information. Occasionally an expedition is formed for the express purpose of gathering information regarding our little-known neighbours and their country, to facilitate the general administration of the British provinces; and such an expedition was sent from Bhamo northwards, along the banks of the Irawadi, at the end of last year. It was commanded by Lieut. Elliott, Assistant-Commissioner, who was accompanied by Major Hobday, an officer of the Indian Survey Department, and Lieut. Blewitt, of the 60th Rifles, Intelligence Officer, and was escorted by a detachment of seventy military police, of the Mogaung Levy.

The following notes are gathered from the reports of Lieut. Elliott,

and the map in illustration is taken from the sheets of Major Hobday's survey.

The expedition was formed at Senbo, about 40 miles above Bhamo, and commenced its march on the 24th December, 1890, and on the 31st December reached Myitkyina, which place is the headquarters of a Kayaing, and the highest point on the right bank of the Irawadi to which our direct administration extends. Being the highest Shan village on that bank of the river, it was formerly the limit of the old Burmese rule; and there is a fair road thence westwards to Mogaung, *viâ* the Nanti Valley, much used by the Chinese traders to the jade and amber mines and the forests producing rubber, which is largely extracted for foreign export.

On the 5th January, 1891, the expedition reached the confluence of the two principal branches of the Irawadi, the Mali Kha and the 'Nmai Kha, of which the western river, the Mali Kha, descends from the Kanti Hills on the southern borders of the Zayul Valley of Tibet, while the eastern river, the 'Nmai Kha, comes from sources which are still unknown, and follows a course of which all but the lower portion is still conjectural.

The expedition continued its advance along the right bank of the Mali Kha, over a route parallel to the river, a few miles to the west, which was bad and difficult to travel, but passed through a well populated tract of country; the villages of Talaug, Pumwai, Supkha and Siyangkong were halted at in succession, and finally Tingga, situated on a hill called Pumlumpum, which was reached on the 15th January. This was the northernmost point attained; it is situated in latitude $26^{\circ} 15'$, at a distance by road of 57 miles from the confluence of the Mali Kha and the 'Nmai Kha, and 208 miles from Bhamo. From this hill Major Hobday obtained an excellent view of the country to the north, up to within a short distance of the southernmost points reached in the Kanti country by Woodthorpe and MacGregor in the course of their expedition from Assam.

The expedition returned southwards by the same route as far as Pumwai, and then turned down to the village of Sabaw on the Mali Kha, and, passing Warcin, proceeded to the Kwitao ferry, by which the river was crossed in two days, with the aid of two small rafts and a Berthon boat. Then marching across the country between the two rivers, by way of the village of Seinman, in two days the expedition reached the important and much used ferry of Lekennoi, on the 'Nmai Kha. Crossing the river here, the expedition marched down the left bank to the Saibak Taru ferry, and then proceeded *viâ* Maitompum to the Shan village of Maingna on the left bank of the Irawadi, about two miles above Myitkyina on the opposite bank. This completed the first and principal trip of the season.

In the second trip the expedition started from Maingna, on the 5th

February, and proceeded in a north-easterly direction to ascertain whether it would be possible to strike into the 'Nmai Kha Valley and explore it for some distance northwards, though it was known that the inhabitants of the country were somewhat wild, and little hope was entertained that the small column would be able to make its way far northwards. The route taken was first over the plains to Kwitu, and then eastwards, across two ranges of hills, to Lakapyang. From thence to the village of 'Nsentaru on the 'Nmai Kha is only about fifteen miles, but neither guides nor any assistance to proceed further northwards could be obtained, and it was not expedient to attempt the journey in face of the covert hostility of the Sadon tribe who hold the country. Thus the expedition turned southwards to Wangkatong, in the country of the Maran tribe, who were found to be very friendly, in striking contrast to their neighbours the Sadons. Thence, continuing southwards, in a few days the hamlet of Nachang was reached, from which a fine view of the adjacent portion of the frontier between Burma and China was obtained. Thence the expedition returned westwards, via Kazu and Sampun, through a well populated country, and reached Waingmaw on the Irawadi on the 25th February.

For the third trip the expedition started from Talawgyi, twenty miles below Waingmaw, on the 8th March, and proceeding eastwards in four days reached Kuntaoyang, a Shan-Chinese settlement of people from the Meungla Santa valleys of China just across the frontier. Hence a visit was paid to Ningrong, which is situated on the summit of a very steep hill called by the Kachins Shankatawt, or the place where the Shans turn back. The whole of the range belongs to Sadon and 'Sai tribes, who were distinctly unfriendly. Returning to Kuntaoyang the expedition proceeded southwards to Namsangyang, a fertile little plain, where there is a Shan-Chinese settlement, and then to Manmaw, or "new village," a Shan-Burman village on the Upper Molè, which is here a fine stream; big boats reach Manmaw in the rainy season, and there is a good trade on the river. Thence an excursion was made south-eastwards, over paddy plains and up a very steep hill to Pumpien, where a magnificent view of the frontier was again obtained, the positions of the head waters of the Molè and its chief tributaries being clearly distinguishable up to within a very few miles of their sources. From Pumpien the expedition returned westwards by a direct route—a mere track hardly ever used—to Talaw, which was reached on the 26th March.

The fourth trip was a short one to the south-east from Talaw, to fill in some blanks in the mapping of the country between the upper Molè and the Ta Ping rivers.

The indigenous inhabitants of the greater portion of the country passed through in the course of these expeditions belong to various tribes of the great family of Kachins—sometimes called Chingpaws,

which has been corrupted into Singphoa—which are scattered over a great portion of northern Burma. The Kachins are said to be descended from the Karengs, who occupied a region near the Kanti country of the Northern Shans, which is said to have been the original home of the Kachin race. The oldest descendants from this stock are said to be the Marias, Lataung, Lepèi, 'Nkum and Maran tribes, the remaining clans being apparently off-shoots from the parent tribes at some later date. The Kakus, or Kachins of the river sources, hold the country between the Marao stream (about latitude $26^{\circ} 14'$) and the Kanti country, in the Mali Kha Valley and further west. The prevalent tribes among the Kakus are the Maran, Lataung, 'Nkum, Marias and Karine, the 'Nkums being the most powerful.

Formerly every Kachin village was ruled by an hereditary official called a Sawbwa; the villagers were obliged to cultivate his lands without compensation and were subject to many other imposts. These taxes having become very onerous a revolution was started about twenty years ago and spread very rapidly, chiefly in the tract between the Mali Kha and the 'Nmai Kha rivers, which led to the murder or deposition of a large number of the Sawbwass and the appointment of certain headmen, called Akyis or Salangs, in their places. The villages which are now without Sawbwass are called Kamlaos or "rebel" villages, in contradistinction to the others, which are Kamsas or Sawbwa-owning villages.

The difficulty of a march through Kachin country is greatly enhanced if the people of the villages passed through have no Sawbwass and are Kamlaos and not Kamsas. With a hereditary Sawbwa, if he is friendly, no trouble need be expected from the villagers, but in a Kamlaos village, which is practically a small republic, the headman, however well-meaning he may be, is quite unable to control the actions of any badly disposed villager as the latter would strongly resent any restraint on the part of the headmen on his liberty of action. The movement for the abolition of Sawbwass is believed to be slowly extending to the north of the confluence of the two rivers, but it is doubtful whether it is really gaining much ground, as certain Kachin villages near the Chinese frontier are disgusted with the new state of affairs and the lawlessness involved thereby, and are negotiating for the return of their Sawbwass, who, however, do not seem anxious to rejoin as they are not as yet certain of their position.

The most dense population of Kachins lies to the north, mostly between the Mali Kha and the 'Nmai Kha rivers; there, too, the people are more independent than their kinsmen to the south, who have been more thrown among the Burmans and Shans. When the expedition passed through their villages they hardly exhibited any curiosity or alarm as to what must have been to them an entirely novel sight. They look upon the country as their own, and scout the idea of any intervention

in their affairs being either possible or probable. Owing to the vicinity of the amber mines, amber ear-ornaments were very common, some quite three inches in length and narrow and cylindrical in shape. Every little child carried a *da*.

There are numerous Chinese settlements among the Kachin villages, those particularly to the east near the frontier. Even to the west of the Mali Kha there are such settlements, as at the villages of Marao Sata and Supsayang, which are situated a few miles to the north of Pumlumpum, the most northern point reached by the expedition: there a few hundred Chinamen are engaged in cutting trees for rubber, in making salt, and in gold washing. These men came very recently from Kayon and Sanai in China, at the invitation of a local Sawbwa; and they are examples of the steady manner in which the Chinese are pushing their way into the Irawadi valley, many similar instances being met with lower down the valley. The rubber they obtain is partly sent down the river to Bhamo, but some of it is exported across country to China by a route which crosses the 'Nmai Kha at the 'Nsentaru ferry and then goes on to Sadon and Kayon.

All traders going northwards to the Kanti country, after crossing the Tura river, which joins the Mali Kha below Pumlumpum, are obliged to give presents to the several Kachin Sawbwaws on the line of route as a preliminary to being allowed to pass on.

From Marao Sata upwards the Kakus, or Kaobins of the head waters, are met with, their country extending as far north as the Kanti plain. Round Kanti, to the east and north-east come the Kanong, Passu, and Naukmong tribes, to the north the Kamans, and to the north-west the Khangs. The Karines live east of the Mali Kha; they make *das* and sell them to the people of the Kanti country and on the borders of Assam. The Kanongs live in the high mountains east of the Karines with whom they have a good deal of intercourse; they are noted for their skill at all kinds of iron-work. The Kanongs, Passus, and Naukmongs give *das*, necklaces, and musk as tribute to Wabienla, the Shan Sawbwa of Kanti. The Kamans to the north of Kanti are said to wear rings through their noses. The Khangs are said to be the wildest race of all, and not yet to have taken to clothes of any description. Beyond these tribes no information was forthcoming, other than fairy tales which people the land with ghosts and witches and other creatures of the imagination.

Coal was found on the east bank of the Mali Kha, at the Wata rapid, nearly opposite the village of Warein, and also to the west of the Kron mountain which lies a little further east; the samples brought down prove it to be very similar to the coal found in the Shan States and of an inferior quality to the Chindwin coal.

Smallpox was raging at this time at several of the Kachin villages north of Maingna. On the appearance of smallpox in a Kachin village, the people all promptly take to the jungle and leave the victims of the

disease to get on as they may. It is hardly surprising, therefore, to learn that the mortality from this disease is excessively high.

The village of Kwitu, which was visited at the commencement of the second trip, is a Shan-Chinese village of seventy-eight houses, protected by the Sawbwa of Sagaung hill, and contains four households of protecting Kachins. The Sawbwa was away elephant hunting when the expedition arrived, but made his appearance on the following day, when he was far from sober, and frankly acknowledging the fact, said he would return in the evening. He was found very averse to giving guides or helping in any way, but after a time was induced to assist to the extent of supplying guides. He is a very important Sawbwa, his territory extending east to Lakpyang and west to the Irawadi.

There is another very flourishing Shan-Chinese village called Loisaw, a few miles to the south. One of the features of the block of country lying to the east of the Irawadi and north of Bhamo is the number of these Shan-Chinese settlements. The Kachins encourage them to come over and treat them very fairly well as it is their interest to do, for the Shan-Chinese are very industrious and cultivate large tracts of paddy land, thus ensuring the Kachins from loss if their own vaungya or hill paddy crop turns out badly. They are much afraid of the Kachins, and if the protecting Sawbwa is not willing to help a passing column, they will give no assistance as they dread his vengeance. Their lot in China must be a hard one to make it worth their while to settle in the plains on our side of the frontier, and submit themselves to the caprices of a Kachin Sawbwa. It may be partially accounted for by the excessive tyranny and extortions committed by the officials in China on all who are not pure Chinese by birth, a point that has not been especially remarked upon by travellers in West China. This immigration of the Shan-Chinese into the plains east of the Irawadi is steadily increasing, and should be greatly for the benefit of the country, as they are excellent subjects and should quickly develop this tract under a strong rule.

The system of Kachin protection is not confined to the Chinese settlements; all the Shan villages on the Irawadi and its main tributaries from the east—such as the Nantabet and the Molè Chaung—are under the protection of some neighbouring Kachin Sawbwa. The Kachins do not make many demands on the villages they protect lest they break up, for they are useful to the Kachins as places where they can dispose of their rubber or other produce, and make purchases of salt and other requirements. The protection lies in securing from attacks by wandering bands of Kachins and in taking precautions that the villagers are not kidnapped nor their cattle looted. Should any of these events occur, the protecting Kachins would attack the marauders if strong enough, and if not would endeavour to secure restitution by ransom or otherwise. The system is a very objection-

able one, but cannot be avoided unless the country is placed under British protection; no Shan or Shan-Chinese village can afford to be without its protecting Kachins, as otherwise life and property in the village would not be worth a moment's purchase. If the villagers disagree with their protectors and are unable to secure others to assume their protection, their only course is to break up the village and settle in an adjoining protected village.

Lakapjang is the name given to a large tract of paddy-land watered by the Nam Li, Nam Ming, and Nam Long streams, and cultivated by the Shan-Chinese settlements of Manming, Namlang, Salaw, and Manmugh. The Sawbwa who protects these villages is a brother of the Kwiu Sawbwa, and lives at the fort of Tungaw, on the Loi-Ngo hill, which is a very conspicuous landmark and can be seen for miles around. The Tungaw Sawbwa's country extends as far as 'Nsentaru on the 'Nmai Kha to the north. He refused to give guides to the country in this direction, and it was considered undesirable to proceed further in the face of the covert hostility of the people of the country.

Much of this opposition can be traced to Chinese influence; all along the frontier, from here down to Bhamo, the Chinese traders have acquired a preponderating influence, and they strongly object to any attempts to gain information about the country, as they look upon this as a preliminary to the country being opened up, which they are much averse to, fearing it may damage their trade prospects by introducing competition, or leading to the imposition of taxes, or to the suppression of smuggling which at present thrives unmolested. These Chinese traders belong to large and powerful syndicates and are generally wealthy men; they are most lawless in their ideas and snap their fingers at all authority. The Chinese officials just over the frontier either play into their hands or are treated as mere dummies. The traders can afford to pay the Kachins well for allowing them to pass through their country on the way to and from the mines, and thus acquire great influence over the Kachins and can more or less dictate their policy to them.

On the march from Waingmaw to Talaw, 35 miles, the road the whole way led through vast paddy plains now uncultivated and interspersed with clumps of loose forest. Formerly these paddy plains must have furnished the food supplies for the four large Shan cities of Waingmaw, Kakyo, Maingmaw and Talaw, in their palmy days; now these cities have degenerated into small villages, owing first to the depredations of a Burmese army which was sent to bring them under subjection some years ago, and subsequently to the attacks of the neighbouring Kachins.

The whole of the range on which Ningrong is situated belongs to the Saden and 'Szi tribes, who are both distinctly unfriendly to us. They are powerful tribes, but the 'Szis seem to be gradually assimilated by the

Chinese, who are steadily pushing their way into the country drained by the Irawadi, which properly belongs to Burma. The constant intertribal feuds among the Kachins render the task of the Chinese a comparatively easy one; whichever side is espoused by the Chinese must win the day and be afterwards dependent on their goodwill for its retention of the supremacy.

Namsangyang, lying to the west of the Ningrong range, is a fertile little plain, cultivated by a Shan-Chinese settlement under the protection of the 'Szia. It is at this point that the Chinese seem to be encroaching most rapidly, the probable cause being the vicinity across the frontier of the powerful Chinese settlement of 600 houses at Sama Pa, which is only a day's march over a good road from Ningpwo, and two days' journey from the Santa valley to the south-east.

As the expedition was proceeding from Namsangyang over the Lailum hill, three Sadon villages were passed, at one of which the Sawbwa rushed out and objected to any one riding past his village; he gesticulated wildly for a long time, but finding that no one dismounted or took any notice of him he went home and did not appear again.

At Pumpien the Panthay mule-drivers, after getting into camp, stupidly turned their mules to graze in the paddy plains at the foot of the hill, with the result that three of the mules were stolen by the Kachins. The thieves were found to belong to a village on the Lailum hill, where the people had been somewhat insolent a few days previously. Two of the mules were brought back on the following day, but the third had been taken into China, whence it was eventually recovered, probably by theft, and brought down to Bhamo some weeks afterwards.

The Kachin hills are, as a rule, extremely rugged, consisting of ranges averaging between 2000 and 3000 feet high, with intervening valleys which are generally very confined, and rarely more than a couple of miles wide, but are highly fertile and as a rule well cultivated.

A good deal of opium is grown locally, nearly every village having its little patch of poppy cultivation; but the local output does not nearly meet the demand, and a great deal if not the bulk of the opium is bought, sometimes from passing Chinese traders, but more frequently the Kachins make a little trip across the frontier and purchase the article for themselves at one of the Chinese outlying villages. Considering the enormous amount that is written about the deleterious effects of the drug, it is surprising to find that the Kachins do not suffer in any way from its continued use, being physically a very wiry race, capable of standing a great amount of fatigue and hardship, and being quite unaffected by the very rapid and marked changes of temperature that distinguish these hills.

A road might easily be made from Bhamo to a point above Senbo, to avoid the dangerous passage of the upper defile in the river during the

rains. It would lie through plains the whole way. It has already been roughly opened up as far as Teinthaw, on the Molè Chaung, and might be continued through Theinlo and Manpang to Shwe-in, at the mouth of the Mogaung river. This route would be circuitous, but would have the advantage of passing through some villages; plenty of labour for its construction could be obtained in the cold weather from the regular immigration of Shan-Chinese who come across the frontier in search of work at this season of the year.

The Kachin country is largely covered with forest, but only a very little teak was observed, generally in small clumps along the headwaters of the minor streams discharging into the Irawadi. Of late years there has been a marvellously rapid disappearance of the rubber tree throughout a great portion of these hills, and without some proper system of conservation it is feared that the rubber trade will suffer great reductions after a few more years owing to the diminishing out-turn of rubber.

Every year more and more Kachins are being ousted from their homes in the uplands, owing to the pressure of the population behind them, and are settling themselves and taking up new lands in the province of Burma. These Kachins, and the Shan-Chinese settlements they protect, do not as yet pay any revenue to our Government, though they are inextricably mixed up with Burmese Shans who do. On every ground of justice and expediency it seems advisable to insist on the payment of the capitation tax by all Kachins, Shan-Chinese and others who are not actually living in the hills, and thus to place them on the same footing as the adjoining Shan villages. It is but too evident that the present system encourages the Kachins to think but lightly of a power that has not yet assessed them to taxation, and it is this misguided idea of our weakness that gives a stimulus to the many troubles always fermenting on the frontier, and that furnishes a powerful weapon in the hands of Chinese agitators.

An important point for consideration is how the exactions of the Kachins on passing travellers, which at present so greatly damage the prospects of any development of internal trade, may best be done away with. These extortionate demands have practically stopped all traffic with the Kanti country to the north, and every highway to China lies for some distance through the Kachin hills, which means that the price of every article carried through is so much increased, as practically to prohibit the opening of many minor trades which would probably spring up were these imposts to be removed.

The Kachins living in the hills athwart the trade routes seem to be undergoing a downward tendency since all the struggle for existence has ceased. Formerly they were a fine race, and they certainly proved themselves much the better men of the two in their contests with the Burmese Shans, which have caused the latter to withdraw from the

interior of the district, and maintain a precarious existence in the villages on the Irawadi; but since that time all incentive for any exertion has been taken away from the Kachins. With his Shan-Chinese settlement at the foot of his hill, the Kachin need not fear starvation, and his few wants are more than met by the proceeds of the blackmail he levies on travellers. Under these circumstances, with all stimulus for work removed, these Kachins on the trade routes are bound to degenerate, and symptoms of demoralisation seem to be already setting in. As the country is taken up it will be interesting to watch how these Kachins will adapt themselves to the changed conditions of life, and whether they will be able to resume honest work again, or will simply drift into incorrigible vagabonds.

It must be remembered that the above remarks do not apply to the Kachin race generally, but only to the large section that are found controlling the various trade routes throughout the Bhamo district. The Kachin population is very large indeed, and seems to have been greatly under-estimated; there is great vitality in the race, and their rate of increase has been very rapid. Unlike many other wild tribes there appears no probability of their ever dying out from contact with civilisation. The quick manner in which they are pushing their way down from the north and spreading out over the country is deserving of serious attention. It is within the memory of men still living when the hills east of Bhamo were inhabited by Palaungs, and it is only within the last twenty years that the Kachins further encroached into the Irawadi valley. Their rate of progression in the Mogaung subdivision, west of the Irawadi, has been equally rapid. These facts are most suggestive and speak for themselves.

As regards the large bodies of Chinese who cross the river to and fro between China and the jade mines and rubber region, it may be said that they form a very real menace to the safety of the Mogaung subdivision; they all represent themselves as traders, but they are believed to smuggle liquor largely, and the contents of the packages conveyed by their caravans are unknown to the local officials, except in so far as the headman of the caravan may enlighten them. Large bodies of the lowest Chinese could be rapidly passed across the river for unlawful purposes without the least information being forthcoming from the local riverine officials.

Lieut. Elliott makes no mention of the customs, dwellings, dress, religion, &c. of the Kachins, but says they will be found very well described by Dr. Anderson (who from his prolonged detention in the Kachin Hills had ample opportunities of studying them at leisure), in his book 'Mandalay to Momein.' Lieut. Elliott adds that it would be a very great advantage if all the available information concerning the Kachin clans, viewed ethnographically, could be collected from the four districts - Bhamo, Katha, Ruby Mines (including Momeik), and the

Northern Shan States—in which Kachins are generally found, and if all this information could be summarised into one report, to be circulated among the different districts concerned, and kept up to date by corrections and additions of new information. This would allow of the Kachin race being treated as a whole, and not piecemeal according to the arbitrary distinctions of district boundaries which do not correspond with the distribution of the tribes, so that at present half of a clan in one district may be on good terms with the Government whilst the other half in an adjoining district may suffer from operations which have to be carried on there. This unsettles the Kachins, who do not understand it, and causes a good deal of unrest which may reach through the neighbouring country.

As regards the direct geographical results of the expedition, all new ground passed over and much of the adjoining country was surveyed and mapped out with more or less accuracy, and a good deal of the region beyond was mapped from native information to a distance depending on the advantages offered by the points of view. The hill at Pumlumpum, the furthest point on the Mali Kha river, gave an excellent command of the country to the north, to within a short distance of the region already surveyed from Assam by Colonel Woodthorpe, the intervening hills being low and insignificant.

Major Holday says of the map that "the whole must be treated as a reconnaissance. As we were marching for weeks together, often with a wall of forest on either side of the path, this rendered triangulation and survey in detail impossible; but advancing as we were from south to north along a meridian, the work was well checked by careful observations for latitude at every other camp, whilst points in our rear always assisted us in determining our longitudes. The total area thus reconnoitred is roughly 3600 square miles, on the scale of four miles to the inch, to which may be added some 1000 square miles mapped by Sub-surveyor Sher Shah, who accompanied Lieut. Burton's force into the Kachin Hills east of Bhamo, so that we now possess a fair knowledge of the frontier from the 24th to the 26th parallels of latitude."

There is an absence of all reliable information regarding the head waters of the 'Nmai Kha. The Kachins seem never to go there as the country is so wild and bleak. There does not appear to be any trade at all, and the river is probably a furious mountain torrent, dashing through profound gorges, and impracticable even for rafts of the lightest kind. This tract of country seems destined to remain for a long time unknown, as the obstacles to any movement through it to any distance north seem well nigh insuperable.

The expedition halted at the confluence of the Mali Kha and the 'Nmai Kha for three days—3rd to 5th January—during which Lieut. Blewit took some rough measurements for ascertaining the volumes of the two rivers. The results gave 33,500 cubic feet per second for the

'Nmai Kha and 23,000 for the Mali Kha. The temperature of the former river was found to be 5° to 6° colder than that of the latter. Major Hobday believes the course of the 'Nmai Kha to be not much longer than that of the Mali Kha, and he thinks that the 'Nmai Kha cannot receive the Lu river of Tibet, which he believes must be the source of the Salwin river.

Further evidence to the same effect is given by Lieut. Elliott, who, after quoting MacGregor's narrative of Woodthorpe's trip—wherein it is stated that there are two rivers east of Kanti, the Nam Tisan and the Phung Mai—says there can be no question that the Phung Mai is the 'Nmai Kha in its upper reaches: the Kanti Shans expressly called it the eastern branch of the Irawadi, and the great similarity of the names, which (stripped of words signifying stream or water) are Dumai, Phung Mai, and 'Nmai, tends to show the identity. The depth given by the Kanti Shans would also accord with the probable depth of the 'Nmai Kha in that latitude; they describe it as not deep but not fordable, or somewhat deeper than the Mali Kha in the same latitude. Besides this, the distance from the Kanti country east to the Phung Mai is said to be nine marches, or in a straight line about 45 miles, which would approximately correspond with where the 'Nmai-Kha valley must be, if we assume that the Lu river is the source of the Salwin. The Kantis also said there were two or more big rivers to be crossed before reaching China, and these would obviously be the Lu and the Lan Ts'ang or Mekong. Little doubt can now remain—says Lieut. Elliott—that the Lu is identical with the Salwin. Colonel Yule, in his introduction to Gill's 'River of Golden Sand,' states that the chief ground for discrediting the length of the course of the Salwin and its Tibetan origin was its comparatively small body of water, and adds that this may be due to its restricted basin. Lieut. Elliott says that all the information they could collect tends to confirm the truth of this reasoning; and that as far as we know all the water up to within a few miles of the Salwin falls into the Irawadi drainage; it is the vast discharge of the latter river, combining the Mali Kha, 'Nmai Kha and Chindwin areas, that makes it develop so rapidly into a noble river, and the same reasoning will tend to make us look not very far for the sources of the river. It is doubtful if the 'Nmai Kha or main stream of the Irawadi has any source higher than 28° 30'. Yule calls the east branch of the Irawadi the Chitom, Shete, Kuts'kiang and Khinshi Ho. These are the Tibetan and Chinese names, and as all the information obtained by Lieut. Elliott was from purely Kachin sources, he was unable to identify the river under any of those names.

It has already been shown by General Walker in his paper, "The Lu river of Tibet; is it the source of the Irrawaddy or the Salwin?" which was published in the 'Proceedings' of this Society for June, 1887, that doubt was first thrown on the long accepted opinion that the Lu

river is the source of the Salwin by Herr Loczy, the geologist attached to Count Szechenyi's expedition to Western China and Tibet, who crossed the Salwin a little below the 25th parallel, on the road from Talifu to Bhamo; he maintains the Salwin to be too insignificant to have its sources far off in the heart of Tibet, and therefore that the Lu river must be the source of the Irawadi.

Up to the present time we do not possess any certain information regarding the course of the Salwin above the 25th parallel, nor of that of the 'Nmai Kha above the 26th parallel, nor of that of the Lu river of Tibet below the 28th parallel. There is thus a large area of which the geography is still unknown, even in its faintest outlines; it presents a field of investigation for future explorers; but until it has been explored there can be no certainty whether the Lu river is the source of the Irawadi or the Salwin.

Views in Circassia, with Notes by the late Admiral Saumarez Brock.

There are probably many—even many Fellows of the Royal Geographical Society—who would be puzzled to say offhand in what part of the Caucasus is—or was—Circassia. The common blunder by which Schamyl, the hero of Daghestan, has been turned, in Western Europe, into a Circassian, is unfairly misleading.

The home of the Circassians—before they left it for the Turkish dominions—was, roughly speaking, the Caucasian range west of Elbruz, excluding Abkhassia—the coast lands about Sukhum Kaleh. Of recent years this region has been but little explored by Englishmen. Mr. Crauford Grove touched only a corner of it, Mr. Philippe Wolley another corner. Mr. and Mrs. Littledale have recently sojourned in its forests in pursuit of big game, but no account has yet been published of their experiences. The forests of the Zelenchuk are still the abode of the aurochs, or wild bull, of magnificent deer and countless chamois.

About and before the time of the Crimean War, Circassia was frequented by Englishmen with political motives. The volumes of Spencer, Bell and Longworth are full of curious matter, though sadly wanting in topographical details. It is to the same period that the sketches lately shown in our rooms belong. Captain, afterwards Admiral, Saumarez Brock was sent on a political mission among the then still independent tribes, and made good use of his pen and pencil to record the features of their country. He gives, of course, but an imperfect picture; there is much left to be discovered—the snowy crests of the central chain, which even west of Sukhum Kaleh reaches a height of 10,600 feet, the strange remains of early races buried in the forests. There is probably no tract of country so near Central Europe so little known.

The pictures shown in the Society's Rooms were executed by an Italian artist, S. Boschi, from the Admiral's sketches. It may be hoped that they may instigate some adventurous holiday-maker to give to the Western Caucasus a share of the attention that has been freely bestowed on the central portion of the chain. The notes Admiral Saumarez Brock wrote to illustrate them are still full of interest, and they will be serviceable if they stir up some travellers to fully investigate the park-like uplands and wooded crests of the western spurs and the glacier-clad peaks

—the “Maritimes” of the Caucasus—which are seen from shipboard to the north and west of Sukhum Kaleh. Some of the tombs and dolmens hidden away in the mountains have been photographed for the Museum at Tiflis, but, so far as I know, no adequate description of them has been published by a competent archaeologist.

The following are the descriptive notes mentioned above. The numbers refer to the drawings exhibited.

SOUTH SIDE OF THE CAUCASUS.

I. The village of Ismael Bey, a Circassian chief having the rank of colonel in the Turkish service. It is situated in the valley of Bardan on the border of a small mountain stream of such a meandering nature that it has to be crossed thirteen times on the way down to the beach, which is only three miles distant from the village.

The Bay of Bardan is celebrated for the successful resistance always made there by the Circassians to repeated attacks of the Russians, who never effected a landing, but were invariably repulsed in their attempts.

II Scenery on the river Subash; now apparently a small meandering stream, but in the spring, after the snows begin to melt, or after continued rain, it becomes a furious torrent utterly impassable and quite filling up the space between its banks. It discharges itself into the sea at Fort Goloven, now in ruins and deserted. This fort was formerly the scene of most bloody strife between the Circassians and the Russians.

The extraordinary blue and transparent atmosphere is peculiar to this region.

III. The habitation of Haji Yedig, a Circassian chief of large property, and who subsequently accompanied me during my wanderings into the interior of the Caucasus.

The time is sunset, with the sea appearing in the distance; the whole atmosphere one flood of golden light. The houses of this chief, in common with all I visited, are of the simplest construction of wicker-work, plastered with mud, and covered with reeds or shingle.

The spot chosen for their erection is on a natural plateau surrounded by streams and wood, with considerable patches of cultivated land in its vicinity.

IV. Tombs.—These extraordinary remains of a long-forgotten race (for the Circassians have no traditions respecting them, except that they were the residences of a nation of Pigmies who rode horses no bigger than hares, and whose gigantic slaves were the architects) are to be met with all over the country; in some places collected together in the plains in regular lines, to the number of hundreds, and in others to be found in dense forests, far from human habitations, thinly scattered over the hill-sides; hewn out of the solid rock, or enormous boulders of stone.

The drawing represents one of the latter, 13 feet long and 10 broad. The circular aperture in the face is common to all I saw, and is supposed by the Circassians to be the door through which the diminutive inhabitants found entrance. Many other tombs were in the neighbourhood, but of inferior construction.

THE NORTH SIDE OF THE CAUCASUS.

V. In the preceding view was portrayed the last tomb I saw on the south side, and I have reason to believe that I was the first European traveller who from that place crossed the Caucasian range over to the north side amongst the Abazecs. The remainder of the views will at any rate have the charm of novelty, and the

accompanying sketch gives a faint representation of some of the beautiful scenery to be met with in that country.

The cluster of straw-roofed houses is the residence of a celebrated chief who was absent, but who now, at the age of eighty, is constantly engaged in that harassing warfare against the Russians, which I fear is likely to be waged for some time longer. The honours of his house were, however, efficiently done by his daughter, named Fish, the most beautiful woman I saw in all the country.

The range of mountains in the distance which we had crossed may give some idea of the difficulties we had to encounter in our journey, and forms the boundary between the Abazee and Ubikh tribes and is the common grazing ground of their flocks and herds during summer.

It was formerly the scene of bloody battles between the various claimants, but their feuds are now forgotten and the flocks of the two tribes feed peacefully together.

VI. Tomb on the bank of the Saguasash, a most rapid and turbulent river and icy cold.

It is crossed by one of the only two bridges in that part of the country, constructed in the simplest manner from the trunks of wild vines suspended from rock to rock and floored with wicker-work. It vibrated awfully as we crossed, which we were obliged to do one at a time.

This tomb was the most perfect I saw, and is placed in the midst of a dense forest, many miles distant from any habitation and most difficult of access. The formation of the tomb is different from the last shown, as it is composed of large blocks of stone, well fitted, and of several pieces and not hewn out of the rock.

These tombs are doubly remarkable from the fact that there are in the whole country no stone buildings, neither houses nor walls, and that the inhabitants have now no traditional account of who were the architects, more than the silly legend before mentioned.

The mechanical skill requisite to place these large blocks of stone in position shows that their builders must have been acquainted with some moving power, the remembrance of which has entirely faded from amongst the recollections of this singular people, who themselves are unacquainted with the simplest mechanical contrivances.

The form and workmanship of these tombs, though unadorned, is not wanting in a certain sort of architectural beauty.

VII. A strangers' house.—A Circassian dancing occupies the floor, moving to the rough music of a bass viol and violin played by two Russian deserters, of whom many are scattered over the country. This music was accompanied by a low clapping of hands.

Overhead on the cross beam is another Russian, who was arrested whilst I was present and carried off to prison. Sufficient evidence was found on his person to prove that he was a spy, and he was hanged a short time afterwards.

The will dance, the glittering arms suspended from the walls, and burnished by the fire-light which coloured the swarthy countenances of the various Circassians seated around, created a picture not easily forgotten. The chief of this village was Hadji Kherandoe, one of the most influential and celebrated amongst that nation of brave men.

VIII. Abazee. Ipsaguk Valley.—The view represents one of the frontier villages nearest the Russian forts on the Laba river. It was destroyed twelve years ago by a Russian force on its way from one of the forts on the Laba to the sea-coast.

At present the scene is one of great beauty and peaceful retirement, and is

remarkable for its enormous old oak-tree near the village, which is used as a place of meeting of the chiefs of the Abazek and Nogai tribes when in council. The whole of this part of the country is undulating and fertile, interspersed with streams and forests of valuable woods, but uncultivated near the forts on account of the uncertainty of life and property in the mutual forays of the Circassians and Russians.

IX. Mountains of the Abazek.—The varied scenery of this most interesting country perhaps cannot be better shown than by contrasting the view here given of some of the extraordinary freaks of nature in the formation of the hills amongst the mountains, with the somewhat tame though lovely landscape of our previous sketch.

The fantastic shape of the mountain peaks and the brilliancy of the colouring of the cliffs and foliage, contribute to form an agreeable picture, and it was with no small degree of pleasure that I rested for some time there in contemplating its varied beauties, as a pleasant break in our fatiguing and dangerous journey.

Mount Bubek in the distance, with its snow-clad peaks, lends its aid to form a most charming coup d'œil.

X. Interior of a cave on the summit of the secondary range* of the Caucasus, 9000 or 10,000 feet above the sea.—Being benighted on our road across the mountains we were necessitated to take shelter in the cave, which in the rainy season was the bed of a torrent. We were delighted to escape from our weary journey through the snow, and accompanied by two shepherds as guides carrying a huge kettle, took up our abode in it for the night.

Hungry and tired, we were truly thankful for the small lambs, cooked in snow water, without bread or any condiments to season them, and I do not remember to have enjoyed a dinner more heartily than that eaten amongst the snows of the Caucasus by the light of our scanty fire.

The scene represents Haji Yedic and another Circassian saying their prayers, and the important operation of cooking our lambs. The fitful blaze of our fire lighting up the cavern, the dark night outside, and the stars studding the deep blue sky, rendered our position most picturesque, although intensely cold.

XI. View outside the cave.—At early dawn we were awake, and on reaching the mouth of the cavern, the view attempted to be described in the sketch met my gaze. On the left was Mount Elbruz, clad in eternal snows, towering to the height of 18,500 feet above the level of the sea, and just tipped by the beams of the rising sun, which clothed the mountain tops as he rose with a delicate pink, gradually changing into a golden hue.

Beneath our feet appeared what at first looked like a large bay studded with islands, with the sea breaking violently on the different points of the coast, in other places running into deep indentations, ending in a calm land-locked harbour, where apparently the fleets of the world might anchor. All was so silent, so tranquil and natural, that it was difficult to believe that what was apparently the sea was only the clouds in the valleys not yet dispersed by the sun's rays, and that large and mountainous promontory in front was nothing more than a group of mountains higher than those surrounding, and forming part of the grand chain of the Caucasus.

Mount Elbruz is the highest of the Caucasian ranges and has a glacier between its two peaks; between them is placed the scene of Prometheus' agonies by the mythologists, and the Circassians have a firm belief that he still lies bound there and that any man who could scale the snowy heights of the mountain would witness them.

* That is, the limestone ridge that runs parallel to the main granitic chain.

XII. Mount Fisht.—The last view, with which I shall conclude these memorials of a most interesting journey, is a representation of Mount Fisht (9360 feet), amongst whose snows the river Saguasash takes its rise, and after flowing in a most tortuous course through the mountains, issues into the plain of Degnak and ultimately into the river Laba.

This mountain is in the centre of the secondary range of the Caucasus. Its abrupt red precipices and the patches of snow constantly found even during summer, contrast strangely with the green pine forests at its base and render it a remarkable feature, amongst the many beautiful scenes which Circassia affords to the artist.

With this view I close the sketches I have taken in the country, and if they afford to my readers only a tithe of the gratification they gave me in visiting the spots they represent, I am satisfied.

GEOGRAPHICAL NOTES.

Death of Mr. H. W. Bates.—It is with the deepest regret that we have to announce the death, at the age of sixty-seven years, of Mr. H. W. Bates, F.R.S., of bronchitis following on influenza. He was for twenty-seven years the able, universally esteemed, and much-loved Assistant Secretary of the Society and Editor of its Transactions. For the present it is impossible to do more than make the sad announcement, and refer to what is said about Mr. Bates in the report of the last meeting of the Society. In the April number of the 'Proceedings' a detailed account of Mr. Bates's life and work will be given.

The Assistant Secretaryship.—At the meeting of the Council on the 22nd February, Mr. J. Scott Keltie, who has filled the office of Librarian for seven years, was appointed to succeed the late Mr. Bates as Assistant Secretary and Editor of Transactions.

The next International Geographical Congress.—At the request of the President of the last International Geographical Congress, held at Bern, the Council of the Royal Geographical Society, at its meeting on January 25th, appointed a Committee for the purpose of making arrangements for the holding of the next Congress in London, in 1895. The Council appointed Major Leonard Darwin, R.E., as Chairman of the Committee, and Mr. Keltie Secretary, the following to constitute the original Committee with power to co-opt not more than six members, representing provincial or colonial Geographical Societies, the Imperial or Colonial Institutes, or other bodies or interests connected with the Congress:—The President, Sir M. E. Grant Duff; Hon. Secretaries, Mr. D. W. Freshfield, Mr. H. Seebohm; Sir G. Bowen, Mr. Delmar Morgan, Mr. R. N. Cust, Mr. C. Peek, Sir Chas. Wilson, General J. T. Walker, and Mr. C. R. Markham.

Projected Glacial Exploration in the Karakorum.—On February 6th the members of a mountaineering and scientific expedition, under the leadership of Mr. W. M. Conway, sailed by the steamship *Ocampo* for Karachi, whence they will proceed by way of Abbotabad and Kashmir to the mountains of Baltistan, on the frontier of Eastern Turkistan. Their object is to make a thorough exploration, as far as may be possible with the time and means at their disposal, of the glacial area of the Karakorum Range. They propose to make one of their centres the great Baltoro Glacier, mapped in 1860-61 by Colonel Godwin-Austen. (See Jour. R.G.S. 1864). They will make scientific collections and observations of glacial phenomena. The Baltoro, Punmar, and Biafo glaciers, which unite their streams in the neighbourhood of Askolei, are believed to be the largest glaciers in the world outside of the Arctic and Antarctic regions, and their upper levels and the passes leading over them towards Hunza have never yet been fully explored. Mr. Conway is accompanied by the Hon. C. G. Bruce and Mr. J. H. Rondebush; and they are taking with them Mr. A. D. McCormick, the artist of the expedition, Mr. Oscar Eckenstein, a well-known Alpine climber, and Mathias Zurbiggen, of Macugnaga, one of a famous family of Alpine guides. It is their intention to make a determined attempt on one of the loftiest peaks, with a view to discovering the limit to which qualified mountaineers can climb without being stopped by the rarity of the air. The expedition has been subsidised by the Royal Geographical Society and by the Royal Society.

The Le Marinel Expedition to Katanga.—Lieutenant Paul Le Marinel has now published in the *Mouvement Géographique* some of the observations made by him on his journey from Lusambo, the Free State station on the Sankuru, to Katanga, last year. Lieutenant Le Marinel, it will be remembered, commanded the first Belgian expedition which succeeded in reaching Bunkeia, the capital of the chief whom we have been in the habit of calling Meiri. It appears, however, that in this we are wrong—and Le Marinel's criticism is confirmed by Mr. Swan, the English missionary, now in England, who spent between two and three years in Katanga. The name of the chief is variously rendered—Mushidi, Mahidi, or Maidi, but never Mairi. Some of the natives call him Mwenda. On leaving Lusambo (1740 feet), the expedition took a southeasterly direction, and gradually ascended to from 3300 or 4000 feet. Between the Lualaba and the Lufira, a chain of mountains rising to between 4400 and 5400 feet was passed. To the south of this plateau region lies the country of Samba, covered with lakes and pools, at an altitude of from 3000 to 3600 feet. To the east, the plateau descends towards the valley in which the Lualaba flows. On the other side of the Lualaba valley begins the mountainous district over which Maidi rules. The expedition crossed three important river-basins, those of the Sankuru, the Lomami, and the Lualaba. The Sankuru flows more towards the east than had hitherto been supposed to be the

case, and the expedition was the means of discovering an important tributary of the Lubilash, a branch of the Sankuru, named the Luembe. The source of the Lomami was found at $8^{\circ} 45'$ south latitude and $24^{\circ} 55'$ east longitude, and Lieutenant Le Marinel estimates that the entire length of this important tributary of the Congo is about 750 miles. The basin of the Lomami is long and narrow, lying almost due north and south, and covering about ten degrees of longitude, while it never strays outside a single degree of latitude. The river does not appear to receive any other important affluents than the Lurimbi and the Lukassi, which latter stream was skirted by Wissmann, but is said by Le Marinel to be much less important than was supposed. Le Marinel also made some important observations as to the Lualaba and its tributaries; but it remains for the Delcommune expedition to ascertain the navigability of this part of the river. Much of the country traversed by the expedition had not before been visited by Europeans. Soon after starting, Le Marinel passed through a thickly populated country, lying along the banks of the Lubi. The inhabitants are apparently in a state of extreme ignorance, and paint their faces and bodies and dress their hair in a most grotesque manner. It was impossible to form any estimate of the population, but for days the expedition was passing through villages full of people, and leaving others to the right and left unvisited. After leaving the Lubi, the course taken lay through the district of Kanioka, where was encountered another hitherto unknown tribe, the Balunga. These people are superior in many ways to the Kalosh and the Bambuo, the tribes inhabiting the Lubi basin. At the Sankuru, the expedition crossed out of the Kanioka district into the country of the Kalundue, whose chief, Mutombo-Mukulu, gave Le Marinel a cordial reception. The most striking feature of this district was the excellence of the paths, which were broad and kept in the most perfect order. After passing through the country of the Babondo, where the people are engaged in constant petty warfare, the expedition came to the elevated plateau in which the Lomami has its origin. To the south of the plateau stretches a district called Samba; a charming country abounding in game and almost more European than African in its character. On the far bank of the Lualaba, Le Marinel found two envoys of Msidi's, waiting to receive him. He at once set out for Bunkoia, through a country differing entirely in its character from that on the left bank of the river. The expedition now passed through a mountainous region where the inhabitants were miserably poor, in many places living in caves and having little notion of cultivating the soil. The prevailing wind was from the east, and it was frequently very cold. Le Marinel thinks that this is a region which it might repay the geologist to study. Of the reception given to the Belgian commander by Msidi it is unnecessary to take note here, since that concerns rather the commercial or political aspect of his mission, than the geographical results of his journey.

A Comparison of the Deserts of North America with those of North Africa and Northern India.—In a paper read before the Geographical Society of Berlin, on the 2nd January, Prof. Johannes Walther made some interesting observations on the deserts of North America, North Africa, and Northern India. It was with the object of being able, from his own observations, to institute a comparison between these deserts that the author took the opportunity, afforded by the meeting of the Fifth International Congress of Geologists, of visiting the North American deserts. The most striking contrast between the North American deserts and those of North Africa consists in the far greater wealth of vegetation which characterises the former. In every direction the eye is met by yellow-blossoming halophytes, silver-grey artemisiae, and prickly cacti; between the opuntias are found cushions of moss, and at the foot of the hills juniper-trees seven feet high, with trunks a foot thick. Such are the features of the landscape of the deserts of Utah, where plant-growth has completely disappeared only in those places where the saline composition of the soil kills vegetation. The Van Horn deserts in Western Texas, the Gila deserts in California, are equally rich in vegetation: the altitude of those deserts above the sea-level makes no important difference. Either the mean rainfall in the American deserts is greater than in those of Africa, or else the flora of the American deserts is better adapted to a dry atmosphere. Although the deserts of the two continents present fundamental differences as regards vegetation, there is a surprising similarity between them as regards certain important and characteristic desert phenomena, especially with regard to the topography of the country. There is the prevalence of plains, with mountains rising from them like islands, with no intervening heaps of debris passing from the plains to the steep mountain slopes. This phenomenon is the more striking as there are no rubbish deltas, even at the outlet of valleys 1000 feet in depth. Another feature common to both is the large number of isolated "island" mountains and of amphitheatre formations in the valleys; also the intensive effect of insolation, which splits the rocks and flints, and disintegrates the granite into rubbish. The denudating influence of the wind is visible not only in the characteristics of the surface-forms just mentioned, which differ in important points from erosion forms, but it can be directly observed in the mighty dust-storms which rush through the desert. In North America, as in North Africa, four types of denudation products are found—gravel beds, sand dunes, loam regions, and salt deposits. In view of such agreement of important and incidental geological phenomena in regions so remote from each other, the phenomenon of desert formation must be considered to be a telluric process which runs its course according to law, just as the glacial phenomena of the polar zone or cumulative disintegration in the tropics. Water, which is such a predominating influence in temperate regions, destroying

the rocks, dissolving them chemically, while the frost pounds them up mechanically, has, in the deserts, about sixty days in the course of the year to do its work of destruction among the rocks and to carry away débris. During the remaining 300 days of the year denudation in the desert is at a standstill, but not entirely. Small and large stones are split by the heat, and huge granite blocks are severed in two by immense fissures; and thus the rocks are destroyed by dry heat at a time when denudation by means of water is reduced to a minimum. In this way the process of destruction goes on in one form or other uninterruptedly throughout the whole year. The disintegrated material is then carried away by the desert rains or by the storms, which whirl great masses of loose matter high into the air and transport it further. It is clear, therefore, that dry denudation possesses an intensive power which, although not equal to the denuding effect of water, may be compared with it.

Exploration in Central South Australia.—An interesting report has only recently been presented to the Surveyor-General of South Australia by Mr. J. Carruthers, of the Survey Department, on the country triangulated in the Everard, Musgrave, Mann, and Tomkinson Ranges, and Deering Hills, during the years 1888, 1889, and 1890. The country surveyed lies between Lake Eyre in the south-east and Lake Amadeus on the north-west. The report gives a useful description of the character of the ranges and of the country generally:—"The Musgrave Ranges are composed principally of red granite rocks, are covered with spinifex and few scattered pines; the flats between the hills, which are principally formed by large creeks coming out of the ranges, are beautifully grassed; wild geranium, vetch, and patches of salt and cotton bush grow luxuriantly, the soils being a rich red sandy alluvial and firm red loam. Mount Woodroffe, the highest point in these ranges, is between 4400 and 4500 feet above the sea-level; from its top a magnificent view can be obtained in all directions. Ayers Rock, about 90 miles to the north-west, can be dimly seen, and Mount Connor a most conspicuous feature to the north, rising abruptly above a sea of mulga scrub, the country between being level and apparently sandy. This mount (Connor) is a large table-topped hill covered with dense mulga, and is noticeable from the fact of there being no other hill near it. Mount Morris, near the western extremity of the range, is the next highest point, being between 4100 and 4200 feet above sea-level; the hills here are more broken, and consequently there is a greater area of good grassed country than at the eastern end of the ranges. The Everard Ranges are chiefly composed of red granite, and covered with spinifex, a few pines, stunted gums, and bloodwoods; the country between the Everard and Musgrave ranges is principally sandy, with patches of dense mulga, spinifex flats, salt and cotton bush flats, geranium, and wild vetch; there are also a few sandhills, but to no extent. The Mann Ranges

commence about 35 miles west of the Musgrave Ranges. The good country here is confined to flats between the hills. The space between the two ranges is mostly covered with a forest of large casuarina trees and occasional patches of thick mulga scrub, carragong, mallee scrub, and sandy spinifex country, and with the exception of only a few native wells is waterless. As the western end of the Mann Ranges is approached, the country becomes more sandy, with scattered broken hills, and considerable stretches of poor spinifex country, the timber being mallee, quondong, casuarina, with low sage bush. The Mann Ranges are covered with pines, bloodwood, a few scattered gums, dense spinifex, and scattered patches of coarse grass, the formation being red and grey granite. The Deering Hills south of the Mann Ranges are also composed of red and grey granite, with a few pines and bloodwoods. The hills are much broken, with well grassed extensive flats between them. The country between the Deering Hills and Mann Ranges is principally of a poor sandy nature covered with dense spinifex, casuarina, mulga, and mallee, but there are small patches well grassed. With the exception of a few rock-holes the country south of the Mann Ranges is waterless. The Tomkinson Ranges, about 25 miles west by north of the Deering Hills, are composed of grey and red granite, with large outcrops or dykes of basalt. These hills are covered with spinifex, scattered pines, small bloodwoods, and patches of coarse grass, and run in parallel lines, confining extensive flats of Mitchell grass, cotton and salt bush, wild vetch, geranium, and other herbs and grasses, the timber being bloodwood, cork trees, patches of mulga, scattered pines, and low bushes, the soil a rich brown and red sandy loam. The country between the Mann and Tomkinson, and north, south, and west of the latter, is very poor, chiefly sandhills covered with spinifex and sage bushes, also a little quondong, mulga, and mallee, with gravelly ironstone on surface of flats between sand-ridges."

Coal in Spitzbergen.—At the Berlin Geographical Society, on January 2nd, Herr L. Cremer read a report upon the journey undertaken by him in the summer of 1891 to Spitzbergen, with the object of exploring the coal-beds there. The author, in the course of his six weeks' journey, travelled along the west coast as far as Magdalena Bay, and found, besides the coal-beds in Ieo Fjord and Bell Sound, which were discovered by Swedish explorers, various other coal-veins which appear to be well worth working.

A New Economical Division of the Earth's Surface.—The January number of 'Petermann's Mittheilungen' contains an interesting map, by Dr. E. Hahn, of the "Kulturformen" of the earth, showing the areas within which different methods of getting a living out of the soil are employed. Dr. Hahn discards the old-fashioned division into hunters, fishermen, shepherds, and agriculturists as containing a fundamental

error; for these three successive "stages" he substitutes six "forms." The simpler forms may have been more widely spread in the earlier periods of the world's history, but all exist side by side at the present time, as methods of cultivation arising from the physical and climatic conditions of the regions in which each is employed. The simplest form is hunting and fishing. The large area which Dr. Hahn assigns to this form in North-eastern Europe and Asia is somewhat remarkable. Next comes what Dr. Hahn calls *Hackbau*, which we may translate by hand-tillage. This form is characteristic of Central America, the basins of the Orinoco and Amazona, tropical Africa, Further India, and the Malay Archipelago, with the exception of certain coast districts. Plantations, the third form, are found wherever coffee, rice, sugar, are grown on a large scale. Next comes what Dr. Hahn calls "our European and West Asiatic agriculture," characterised by the use of the plough, the employment of oxen as beasts of burden, and the growing of corn. Originating in Mesopotamia this form has spread, with but slight changes, over all the more civilised parts of the world. With regard to the fifth form, cattle farming, Dr. Hahn states that the only circumstance which was considered characteristic of the shepherd's life was the fact of his being a nomad. This excluded all whose herds consisted of other animals than sheep or goats. Larger cattle require better food than could always be obtained on the march. He therefore puts all owners of herds in one category, whether nomads or settlers. They are spread over all Central and Northern Asia, and are found in Arabia, on the borders of the Sahara, in South Africa, and in certain portions of Northern Europe, America, and Australia. A curious feature is a long, narrow strip extending from Somaliland into South Africa at varying distances from the East Coast; by his own account, however, it should not have been reckoned to the cattle-farming regions, as the cowherds make little or no use of the milk given by their animals, which are looked upon as mere standards of value and wealth. The last is the elaborate form of cultivation in small plots, which is the only method by which the exhausted soil of China can be got to maintain its huge population.

Obituary.

Colonel James Augustus Grant, C.B., C.S.I., F.R.S., F.R.G.S.—The announcement of the death of Colonel Grant will be received with genuine regret by all who knew him. He died at his house, Houshill, Nairn, on February 11th, from congestion of the liver, which had been of some standing. Colonel Grant was born at Nairn, son of the Rev. J. Grant, the parish minister of that place, on April 11th, 1827. He was educated at the Grammar School of Aberdeen, and at the old Marischal College, where he attended the classes of chemistry, mathematics, natural philosophy, natural history, and botany. The knowledge thus acquired served a good purpose in after

years, when Grant took up the work of African exploration. On June 8th, 1846, young Grant received a commission as Ensign in the 8th Native Bengal Infantry. In 1848 he was present at the two sieges of Multan, and in 1849 at the battle of Gujrat. In 1853 he was appointed Adjutant of his regiment, and remained so until it mutinied in 1857, when he was attached to the force under Sir Henry Havelock and Sir James Outram for the relief of Lucknow. He was wounded while commanding the rearguard, and was blockaded in Lucknow for two months. On October 23rd, 1858, Grant proceeded on sick certificate to England.

It will be remembered that on the return of the expedition under Burton from the discovery of Lake Tanganyika, his companion Speke made a detour to the north and discovered the south shore of the Victoria Nyanza, and conjectured it to be the long-sought for source of the main branch of the Nile. This view was enthusiastically adopted at home, and under the auspices of the Geographical Society an expedition was organised under the leadership of Captain Speke; to the expedition Government contributed 2500*l*. Captain Speke's instructions were "to make the best of his way to the point whence he before turned back, at the southern end of Lake Nyanza, and thence explore to its northern extremity, seeing whether or no it has a northern outlet. If there should be no connection between the Nyanza and the Nile, he is to use the best of his judgment in prosecuting his search to the sources of the latter; and finally he is to endeavour to reach Gondokoro, the missionary settlement formerly occupied by Knoblecher, and stated to be in N. lat. 4° 25'." Speke and Grant had been friends in India since 1847; they had been tiger-shooting on the "Sarda" in 1854. When Captain Grant, therefore, volunteered to accompany Speke in this important expedition, his offer was at once accepted.

The two explorers landed at Zanzibar on August 17th, 1860, and began their march into the interior on October 1st. It is unnecessary to repeat the history of this memorable expedition, in which, although Grant was only second in command, he played an important part. The two men were of very different temperaments and tastes, but Grant was loyally devoted to his leader, and there can be little doubt that his genial, sympathetic manner had much to do with winning the favour of the natives in that great block of new territory to the west and north-west of Victoria Nyanza which was opened up to us by the expedition. Unfortunately Grant's health was so severely affected, that when Speke left Karagwé in March 1862 to proceed to Uganda his companion had to be left behind, and it was not till the end of May that the two again met at the court of the famous Mtesa. It was in July that the Nile was seen tumbling out of the lake over Ripon Falls. Grant's compulsory stay in Karagwé gave him ample opportunities of becoming familiar with Rumanika and his people. After discovering the source of the Nile, and thereby solving the most ancient of geographical problems, and one of unequalled historical interest, the two explorers made their way down the river, not, however, being always able to follow it, and reached Gondokoro in February 1863, to find Baker ready to succour them.

Grant landed in England on June 17th, 1863, having helped to settle the sources of the Nile, and brought home abundant collections, especially in botany. Grant's '*Walk Across Africa*,' published in 1864, is a valuable supplement to the narrative of the leader of the expedition. He devoted himself especially to "the ordinary life and pursuits, the habits and feelings of the natives, and the produce of the country." Important geographical questions were also discussed and elucidated. To the 42nd volume of the '*Journal*' (1872) of the Society he contributed an important paper of 100 pages, containing a "Summary of Observations on the Geography, Climate, and Natural History of the Lake Regions of Equatorial Africa, made by the Speke and Grant Expedition," a much needed supplement to the somewhat meagre account contributed by Speke to the Society. In the '*Journal*' for 1876 will be found

another paper by Colonel Grant on "Mr. H. M. Stanley's Exploration of the Victoria Nyanza." It was he who undertook the greater part of the botanical work on the Nile Expedition, and among other things he made a considerable collection of dried plants now in the Kew Herbarium. A rough list of these formed an appendix to Speke's 'Journal of the Discovery of the Source of the Nile'; and most of the illustrations of this work were from drawings made by Grant. The publication of the first volume of Prof. D. Oliver's 'Flora of Tropical Africa' fired Grant with the desire to have a special volume prepared on the flora and fauna of the expedition. The result was that the whole of the 29th volume of the 'Transactions' of the Linnean Society was devoted to the flora, and it is one of the most interesting of the series. The purely botanical part was contributed by Prof. Oliver and Mr. J. G. Baker; and the 136 plates (prepared at Colonel Grant's expense) illustrating the new or otherwise specially interesting plants, are some of the best work of the late W. H. Fitch.

On the death of his friend Captain Speke (September 15th, 1864), Grant was offered the Consulate of Fernando Po, which he did not accept. In 1865 he was appointed second in command of the 4th Ghoorka regiment, stationed in the Himalayas. He accompanied Lord Napier in the Abyssinian expedition of 1868, attached to the Intelligence Department, and commanded the mission to Prince Kassā of Tigré, the late King of Abyssinia. On the 7th May, 1868, Grant retired from the Army, and passed his time mainly between London and his home in Scotland. He joined the Society in 1860, and during the past twenty years has frequently rendered good service on the Council. His face and figure were familiar at the Society's meetings, and he was the sympathetic friend of every young African explorer. His genial simple ways and chivalrous character won him the attachment of all with whom he came into contact.

Grant received many distinctions. Among them were a gold medal and clasp Multan and Unjerat (1849); medal and clasp for the relief of Lucknow (1857); medal from Pio Nono (1864), and from the King of Italy (1865); Patron's gold medal of the R.G.S. (1866); C.B. (1866); C.S.I., for services in Abyssinia (1866); F.R.S. (1873).

In **Dr. Wilhelm Johann Junker**,* who died at St. Petersburg on the 16th of February, geography mourns one of its most successful scientific explorers. Dr. Junker was born at Moscow on April 6th, 1840; spent his boyhood at Göttingen, received his early education at the German Gymnasium of St. Petersburg, and subsequently studied medicine in the Universities of Göttingen, Berlin, and Prague. After a visit to Tunis, in 1874, he attended the Geographical Congress of Paris in 1875, when intercourse with Schweinfurth, Nachtigal, and other famous travellers, directed his attention to Africa, and more especially to Dar Fur, as a promising field for geographical exploration. In October of the same year he landed at Alexandria, and having spent November 6th to December 6th in an exploration of a portion of the Libyan Desert, in the course of which he travelled from the Natron Lakes to the Fayum,† he started in February for the Upper Nile. Avoiding the well-trodden caravan route connecting Sawákin with Berber, he took his course up the Khor Baraka, of which only the higher parts had at that time been explored by Europeans,‡ visited Kasala and Kedaref, reached the Blue Nile at Abu Hama, and arrived at Khartum in June. A part of July and August was spent in a visit to Sennar, in the company of Grasi, and between August 20th and

* By E. G. Ravenstein, Esq., F.R.G.S.

† 'Petermann's Mittheilungen,' 1880, pp. 179-182, map.

‡ Ibid., 1876, p. 383; 1881, p. 65, map.

September 13th Dr. Junker was able to make an excursion up the Nile as far as the Schat, and to ascend the latter river as far as Naser.

Finding, after his return to Khartum, that circumstances were not favourable to a journey into Dar Fur, which had, moreover, been recently explored by Major Prout of the Egyptian service, Dr. Junker definitely made up his mind to proceed to the Upper Nile, there to continue the work so successfully begun by Schweinfurth and others. Starting from Khartum on October 22nd, 1876, he met General Gordon, who was coming down the river, at Kawa, readily obtained from him permission to travel freely throughout the Equatorial Province, and ultimately reached Lado on November 7th, where he met with a friendly welcome from Dr. Emin. Dr. Junker's object was more especially the exploration of the Makaraka country, lying to the west of Lado, and during about fourteen months' absence from that place (January 22nd, 1877 to March 29th, 1878) he not only succeeded in doing so, but also made an excursion northward into the Bahr-el-Ghazal province, and another southward as far as Kalika and the Kibali river, which is the most important head-stream of the Welle. On June 29th, 1878, Dr. Junker was back at Khartum, and in September of the same year he arrived at Cairo. The valuable collections brought home from this expedition have found their way, for the most part, into the museums of St. Petersburg and Berlin.*

After a short stay in Europe, Dr. Junker returned once more to the scene of his labours, his main object being an exploration of the Nyam Nyam or Zande countries, and of the Welle-Makua. He landed at Alexandria on October 18th, 1879, proceeded by Sawakin and Berber to Khartum, where he arrived in the beginning of January 1880. As the Bahr-el-Jebel was closed at that time by "and," Dr. Junker ascended the Bahr-el-Ghazal to the "Meshra" of the Rok, where he arrived on February 28th. At Dem Solman he parted from Gessi, at that time governor of the province, and on June 9th reached the residence of Ndoruma, one of the most powerful Zande chiefs, who remained a fast friend throughout Junker's stay in the country. He there built himself a zeriba, which he named Lacrima. On August 12th he started for the Welle, which he crossed for the first time on September 20th, visited Mambanga and other chiefs to the south of that river, met Casati at Tangazi, and then returned to Ndoruma's.

In January 1881 he left his station once more to continue the exploration of the region lying to the south of the Welle. In March 1882 he reached the Upper Bamokandi, an important tributary of the Welle; and on May 6th, in long. 28° 10' E., he crossed the Nepoko, which he conceived to be identical with Stanley's Anuwimi, it being in fact only a tributary of that river. In August he left these southern Zande countries for good, and made his way to the residence of Zemio, a powerful Zande chief, living far to the west of Ndoruma. Dr. Junker arrived there on September 27th, 1882, and having instructed his assistant Bohndorff to return to Europe by the Bahr-el-Ghazal, at that time still open, he started in December on an extensive tour through the Western Zande countries, from which he returned only on May 1st, 1883. Up till then, Junker, trusting to native information, had looked upon the Welle as the head of the Shari, but after he had reached that river, first at its confluence with the Werre, in long. 25° E. (January 10th, 1883), and later on still lower down, at Abdallah's Zeriba, in long. 25° 15' E. (February 23rd, 1883), he could not any longer shut his eyes to the fact that this mighty river was indeed a tributary of the Congo, a conclusion already arrived at by Mr. Grenfell, when he had passed beyond the Zongo Rapids of the Mobangi.†

* See a paper on 'Egyptian Equatoria' in 'Pettermann's Mittheilungen,' 1879, p. 445, and 1880, p. 81.

† On the Welle-Shari problem, see Wills's paper, 'Proc. R. G. S.,' 1887, p. 285.

By the time Dr. Junker had returned to Zemio's the revolt headed by the Mahdi had spread to the Bahr-el-Ghazal Province. Dr. Junker, nevertheless, set out in October in the hope of being able to reach a steamer expected at the Meshra. Fortunately Mr. Lupton* kept him well supplied with information of passing events, and Dr. Junker returned to Zemio's. There can hardly be a doubt that had he persisted in his original intention he, like Lupton and Slatin, would have fallen into the hands of the Mahdists.

Dr. Junker left Zemio's on November 16th, 1883, and joined Emin and Casati on January 21st, 1884, at Lado. In the course of 1885 he paid a visit to Amfina, from which he returned to Wadelai, in the November of that year, but it was not until January 2nd, 1886, that he was able to leave that place for Europe. On June 1st he arrived at Rubaga, the capital of Buganda, and on November 29th, 1886, after an absence of over seven years from Europe, he reached Bagamoyo on the Indian Ocean.†

We may say without injustice to Schweinfurth, Petherick, Lupton, Felkin, and others who have preceded him, that it is to Dr. Junker we are mainly indebted for our knowledge of the geography and ethnology of the countries lying to the west of the upper Nile, and more especially of the regions inhabited by the Zande. Dr. Junker, unfortunately, had not acquired the art of making astronomical observations, but his itinerary surveys were made with such care, his compass bearings were so numerous, that Dr. Hassenstein, with the aid of a few latitudes obtained from other observers, was able to plot his amazing network of routes with a considerable degree of confidence. But Dr. Junker did more than supplying materials for the preparation of a map. His notes on the natural history of the country are always instructive, his account of the manners and customs of the people among whom he spent so many years is most thorough, and his meteorological observations, extending, as they do, over many months, are of great value. The collections which he made in the Zande country had to be left behind by Bohndorff, but it can hardly be doubted that if Dr. Junker had lived, much valuable information collected by him would still have seen the light. Dr. Junker's success as an explorer, it should not be forgotten, is largely due to his considerate treatment of the natives. He travelled with carriers only, and not with an armed escort, conciliated the natives by submitting to their customs and rules of etiquette, and exhibited on all occasions a most commendable forbearance.

The scientific results of Dr. Junker's explorations have been published as a supplement to 'Petermann's Mittheilungen,' 1889, with a map on a scale of 1:750,000; his vocabularies of eleven languages, of which ten were previously unknown, appeared in 'Rattner's Zeitschrift für afrikanische Sprachen,' ii. pp. 35-108; his 'Reisen in Afrika' have been published in Vienna, 1889-92. An excellent translation of these Travels, by Mr. Keane, is in course of publication in London.

A report of the paper which Dr. Junker read before our Society in May 1887 will be found in the 'Proceedings' for that year, pp. 399-420. Dr. Junker was an Honorary Corresponding Member of our Society.

Colonel Sir Robert Groves Sandeman, K.C.S.I., died at Lushey, in Biluchistan, on the 29th January. He was a Fellow of this Society, and though he was not himself an explorer or geographer, he had done much to add to our knowledge of an important and little known region. Like Lord Clive, in his youthful days he showed little promise, and many misgivings were entertained by his parents as to the future of "that unlucky Bob"; but he was sent out to India

* Lupton fell into the hands of the Mahdists on May 2nd, 1884. For a valuable paper by him, see 'Proc. R. G. S.,' 1884, p. 243.

† On Junker's journey from the Albert Nyanza to Bagamoyo, see 'Petermann's Mittheilungen,' 1891.

and in that country found opportunities for the successful development of his latent abilities, and eventually rose to become a public officer of considerable eminence. He entered the Indian Army in 1856, and served in the military operations against the mutineers in 1857-58. He was appointed an Assistant Commissioner in the Punjab in 1859, and for sixteen years was employed in the administration of districts on the Punjab frontier. In 1875 he was sent on special duty to Kheilat, which led to his eventually becoming Agent to the Governor-General in Baluchistan, a post which he held up to the time of his death. No frontier officer was better or more deservedly known. The pacification of Baluchistan, and its conversion from a scene of constant civil warfare to a thriving state, was mainly due to his policy and personal force of character. He was essentially a man of action, and it is as such that he will be remembered and appreciated. He pursued persistently an energetic, straightforward policy with remarkable success, and thus gradually transformed a land of predatory warlike tribes, who warred against each other and knew no master, into a country of law and order, with much security for life and property. In announcing his death in the Government Gazette, the Viceroy and Governor-General says: "His untiring energy, force, and steadfastness of character acquired for him a commanding influence upon which the Government could always rely. He was a brave and devoted servant of the Queen, and died, as he had lived, in the discharge of duty. The death of such a man is a public misfortune, and the Governor-General in Council deeply deplores it." His duties in Baluchistan ranged over the enormous area which lies between the eastern frontier of Persia, the southern of Afghanistan, the western of British India, and the northern coast of the Arabian Sea. Much of this region was wholly unexplored when he first went to Kheilat, but he set himself to make extensive explorations in all directions, taking with him officers of the Survey Department to map the country. In this way he caused many thousand square miles of country, outside the region of the regular Topographical Survey, to be fairly well mapped, and he was thus instrumental in the acquisition of considerable additions to the geographical knowledge of a vast extent of country which had previously been very little known.

Sir George Campbell, K.C.S.I., D.C.L., F.R.G.S., M.P., died on February 18th in Cairo, after a month's illness, from congestion of the lungs, following a severe attack of influenza. Born in 1824, eldest son of Sir George Campbell of Edenwood, and brother of the first Lord Campbell, he was educated at Edinburgh, St. Andrews, and Haileybury, and chose early as a career the Indian Civil Service. George Campbell advanced more quickly than most of his contemporaries. After three years' service in Rohilkund, he was put in charge of several districts and political divisions of the Cis-Sutlej States. From 1861 to 1864 he lived on furlough in England, during which time he published two works, entitled 'Modern India' and 'India as it may be.' Returning to India in 1864, he served in various administrative posts in the North-West Provinces, was present at several actions during the Mutiny, and became personal assistant to the Governor-General, Lord Canning. Thereafter he was successively Judicial and Financial Commissioner of Oude, Judge of the High Court of Calcutta, and Chief Commissioner of the Central Provinces until 1868, when he again came home on furlough. In 1871 he again went out to India as Lieutenant-Governor of Bengal, and displayed in that important post administrative abilities of a very high order. Sir George resigned the post after holding it for about three years, and came home as a member of the Indian Council. This appointment he threw up in 1875, in order to represent the Kirkcaldy Burghs in Parliament, and he has since continued to represent that constituency. In later years he published a 'Handy-book of the Eastern Question,' 'White and Black in the United States' (the result of a visit to America) and 'The British Empire.'

written with special reference to India and the Colonies. Sir George has been a Fellow of the Society since 1866, and frequently served on the Council. To the 'Proceedings,' vol. xi. (old series), he contributed a paper on the Geography and Climate of India in reference to the best site for a capital. All that he wrote and uttered was marked by singular liberality and nobility of sentiment, as with intimate local knowledge he was able to combine very far-seeing views. He was greatly esteemed and beloved by his friends and is deeply regretted.

Commander R. F. Hoskyn, R.N., F.R.G.S., died on the 27th of January, in the European General Hospital, Bombay. He went out to India about two years and a half ago, and took over charge of the Marine Survey Department, in October 1889, from Commander Carpenter, R.N. Commander Hoskyn superintended some important coast surveys in the *Investigator*, but never enjoyed good health while in India, and, as a rule, during the working season he had to leave his ship at Madras and go on the sick list. He had actually applied for leave for three months, and it was his intention to go for a voyage to Australia. Unhappily, he was destined never to leave Bombay. The deceased commander, who was very popular in the Navy and in official circles in India, leaves a wife and two children. He has been a Fellow of the Society since 1883.

REPORT OF THE EVENING MEETINGS, SESSION 1891-2.

Fifth Meeting, 8th February, 1892.—The Right Hon. Sir M. E. GRANT DUFF, O.C.S.I., President, in the Chair.

ELECTIONS.—Ernest James Barrett, Esq.; John H. D. Bell, Esq.; Joshua J. Miles Blackburn, Esq.; John Brodie, Esq.; Major P. W. G. Copland-Crawford; Charles Edward Cullen, Esq.; Hans Falck Dessen, Esq.; Rev. William Green; F. W. Kelly, Esq.; Captain John Irvine Lang, R.N.; Professor Herbert S. N. Macaulay; Captain Arthur Montagu McMurdo; Evelyn William Margesson, Esq.; William Wilsey Martin, Esq.; Iofrus Balfour Moreton, Esq.; Thomas Muir, Esq., M.A., LL.D., &c.; Rev. James Pritchard; B. Spicer, Esq.; Edward Charles Sunnuck, Esq.; William Wilson Hind Smith, Esq.; Arthur Truman, Esq.; Charles Estridge Turner, Esq.; John Charles Underwood, Esq.

The paper read was:—

"Journeys in the Pamirs and adjacent countries." By Captain F. E. Young-husband. It will be published, with a map, in the April No. of the 'Proceedings.'

Sixth Meeting, 22nd February, 1892.—The Right Hon. Sir M. E. GRANT DUFF, O.C.S.I., &c., President, in the Chair.

ELECTIONS.—Gerald Brook, Esq.; George Gill, Esq.; Thomas Marwood, Esq.; John Rogerson, Esq.

The paper read was:—

"Journeys in Mashonaland, and Explorations among the Zimbabwe and other Ruins." By J. Theodore Bent, Esq. It will be published, with a map, in the May No. of the 'Proceedings.'

No. III.—MARCH 1892.]

DEATH OF MR. H. W. BATES.

The PRESIDENT: Before proceeding to the special business of this evening, it is my painful duty formally to announce to you what most of those present have already learned from the newspapers, that our excellent Assistant Secretary, Mr. Bates, died on Tuesday last. Since Mr. Bates's first connection with the affairs of the Society, more than a quarter of a century ago, he has had thrown upon him an increasing amount of varied work, and he has done that work always admirably well. Every President, every Honorary Secretary, every Member of Council, and every officer of the Society of every grade, has found in Mr. Bates an admirable co-operator and an admirable friend. He was so good an official that when one talked to him one was apt to forget that before he began to be an official, before he began to be a professional geographer, he was a most accomplished naturalist, and the author of one of the best books of its kind in the English language. Every Member of the Society who was brought across him, and every person coming from the outside who had access to him, found him the most helpful, the most patient, the most amiable of men. That fact is known to a very wide circle, but only those who were intimately associated with him knew what an immense amount of labour he gave to putting into a proper shape the thoughts of men, often accomplished and able, as they were admirable travellers, but who had never practised the art of compressing what they had got to say into the brief compass of a paper which can be read at one of our evening meetings. In that as in every other thing that he did, he was not to be surpassed.

I deeply regret to say that he is not the only one we have to mourn to-day. Colonel Grant, of the Nile, died on the 11th of this month, in Scotland. Colonel Grant was distinguished in early life both in the campaigns against the Sikhs and in the campaigns of the Mutiny, but it was not till about thirty years ago that he became famous through all English-speaking countries. Every one knows that he was an explorer, but a much smaller number of persons know that he was a botanist. Very few have seen the great book published in the 'Transactions' of the Linnean Society in the early seventies, which was entirely composed from the results of investigations he made in Africa. Colonel Grant gave us a great deal of assistance through many years on the Council of this Society, and we were looking forward with great pleasure soon to welcome him back upon the Council from which he has only been removed by the operation of a rule which could not be changed, when we were startled by the news of his sudden death.

The Council has adopted these two resolutions with which I make no doubt the Fellows of the Society will be anxious to associate themselves:—

"The Council request the President to convey to the widow and children of the late Mr. Bates their deep sympathy in the loss that has befallen them and the Society. They trust that the knowledge of the estimation in which Mr. Bates was held by all who knew him, and above all by his colleagues and those best able to judge of his scientific attainments and high and generous character, may be in time a consolation to his family. They feel that the loss to the Society is one which can hardly yet be estimated, and they desire to tender to Mr. Bates's family the assurances they hoped to have offered to himself, on his retirement, of their most warm and heartfelt appreciation of the devotion to the interests of the Society shown by him during his twenty-seven years' work as Assistant Secretary and Editor of 'Transactions.'"

"The Council request the President to convey to Mrs. Grant the expression of their sincere sympathy on the death of the late Lieut.-Col. Grant, their colleague during so many years in the administration of the Society, and one of the most distinguished

of African explorers. The Council feel that the Society has lost a most zealous and enthusiastic Member, possessed of special knowledge which he held always at its disposal, while they will miss at the council table an experienced adviser and loyal friend."

Lord ABERDARE: I am very sorry to stand between you and the gentleman who is about to deliver us an address on so interesting a subject, but I think that many of you will feel that I can hardly remain silent on such an occasion as this. Our President has not left much for me to say, he has spoken with so much discrimination and so much warmth of appreciation that little remains for me to add. There are among the members of the Council very many who have known Mr. Bates far longer than I have, and very many who have the means of knowing far better than I can the extent and range of his scientific knowledge; but as one who has filled the office of President for more than four years, and who was brought into constant communication with him, I may be allowed perhaps in a few words to tell you the impression produced upon me.

He was one of the rarest characters I had ever known. Considering the vastness and variety of his knowledge, it was astonishing to find a man so gifted, with such entire self-effacement and modesty. You may well believe that the office of President, especially to one like myself, who had only a general and superficial knowledge of geography, is not merely difficult but impossible without the assistance of the standing officials; and in Mr. Bates I found not only an ardent follower of knowledge but one of the most sagacious of men. He knew men as well as he knew the butterflies, to seek which he first made his acquaintance with the Amazons. He was a great reader of human nature, but he was more than that. We all of us in the course of our lives, I hope, have met many men who have commanded our respect and also our regard; Mr. Bates was something more than that. It was impossible to associate with him without feeling not only regard but personal affection; and so it is that all those who are taking part in this ceremony to-day feel that in him they have lost one of their best and dearest friends. This is but a small tribute to his memory and to his worth, but short as it is I could not but offer it.

Mr. DOUGLAS FRESHFIELD spoke as follows: It may seem superfluous to add anything to the fitting tributes already paid by you, Sir, and by our late President, Lord Aberdare, to the memory of the colleague and friend we have lately lost. But I feel assured that our Fellows and our guests present here to-night will recognise that to remain silent would be unnatural, if not impossible, for me, who have in the course of the past ten years, in the conduct of the affairs of the Society, been brought more continuously and more intimately perhaps than any one else in contact with Mr. Bates.

The author of 'The Naturalist on the Amazons' has long been known to the reading public as a scientific explorer of infinite patience, endurance and enterprise, and as the writer of a work at once one of the most fascinating narratives of adventure and one of the most important contributions to natural history of our generation; one of those "best books of travel" of which the great Dean of St. Patrick's said they "Serve to open and enlarge the mind." As a naturalist, a close observer, and, what is much more, an accurate and sagacious reasoner, Mr. Bates needs no praise from us; *Laudatur à laudato*, the voice of Darwin yet speaks to pronounce his eulogy. As a man of letters he had talents and a style which Darwin might have envied.

This traveller, in the first prime of youth, risking his life and losing his health in the pursuit of knowledge, content to live for eleven long years by selling his collections, so modest, so regardless of fame that he required to be incited by Darwin to publish

his results, what a lesson lies in his life for our time—for all those who are bitten by that "loveless passion," the love of admiration, who trade for the applause of the moment and make the many their Judges and Appraisers.

The latter half of Bates's life, that which dates from his connection with our Society, is necessarily less public property, and on this I would say a few words. As the head of our office, our Secretary, and Editor of Transactions, a very large responsibility rested on his shoulders. He was brought into contact with all the great travellers—and many of the little travellers—who visit our capital. He had to tame and manage the last African explorer, or to draw out what was worth drawing from a timid missionary. Now he would have to deal with a contributor who resisted all corrections on the ground that his style was pure Elizabethan, now with one who had evolved his own system of transliterating, let us say, Kamchatkan place-names. With each and all, Bates got his own way in the end, and that without quarrelling. He was a very shrewd and by no means always lenient observer and judge of men and manners. His judgments were deliberately arrived at, and expressed with a commanding modesty. But he was essentially generous; it was his pleasure to elicit and bring forward the best in all he had to deal with, men or manuscripts. He joined to the needful firmness a gentle, indefatigable patience. He would re-write—practically re-write—an obscure and tedious paper with as much pains as he would bestow on the material of a Presidential address.

In the last ten years many changes were made in our Secretary's work. Our 'Transactions' were turned into a monthly magazine of which he assumed the editorship; the Society gave up its old school prize system to advance more boldly, in conjunction with the Education Department, the Universities of Oxford and Cambridge, the Oxford University Extension, and the Victoria University of the North, in the important task of raising geography to its proper place in English education. The Council have endeavoured, as the field of discovery narrowed, to widen the scope of the Society, to link it with Commerce, with History, and with the antiquarian research which lies at the roots of Historical Geography—with the Hellenic Society and Asia Minor Exploration Funds, for which our lecturer to-night, Mr. Bent, has done so much valuable work.

All these more or less novelties have meant, in one way or another, new work for the Secretary. Bates never shunned work. Each new proposal he turned over carefully, and criticized independently and usefully, but once accepted in his mind as within the scope and resources of the Society, he carried it out with unflagging energy. I speak naturally of the years I know best; but during the first half of his service here Bates was equally valuable. There are three men among the Society's officers, who more than others, as I believe, built up its prosperity. These were Sir Roderick Murchison, Clements Markham, and Bates. Two of them are our gold medallists. Is it yet too late to add the name of Bates to the golden list in our Hall? However that may be, we may feel sure that when the day comes—as the day must come, and we trust will soon come—when the Society will meet in its own Hall—in a building suitable to its growing requirements, the name of Bates will be linked with those of the creators—the "Membres Fondateurs" in the fullest sense of the term—of a Society which we are proud to be Members of, because we believe it is doing work useful to Science, to the State, and to Humanity.

The following note from Mr. Clements R. Markham to Mr. Freshfield adds what he would have wished to have said himself before the Society:—

"I should like to have said something at the meeting last night to express my feelings about our dear old friend Bates, but there did not seem an opportunity in the face of the crowd eagerly waiting for Mr. Bent's paper.

"I always remember Bates's great modesty even more than his judgment, which was excellent, and his goodness and kindness of heart, which never failed. I knew him when he first came home from the Amazons, and he dined with me twice in 1863; I was charmed with his conversation and his thoughtful way of dealing with every subject. Norton Shaw was then going away, and I suggested to Bates that he should apply for the Assistant-Secretaryship; but he was diffident about it and said he had no experience, though there was nothing he should like so well. Mr. Greenfield was appointed, but after a short tenure died very suddenly in our house in Whitehall Place. Meantime I had spoken about Bates to Sir Roderick, who had seen him and been extremely pleased with him.

"The ground had thus been prepared and Bates was appointed. I cannot tell you what help he was in those days when everything was in utter confusion—no Librarian—no one in the Library but a negligent boy, and tremendous work to get things into order, Bates doing the lion's share. Sir Roderick's high opinion of him increased every year. I mention this that all may know Bates was not a man to push himself, but on the contrary we sought him out. I think this modesty was carried to a fault; for if he had had less we might have had much valuable work from him in the way of views and deductions on geographical points. We shall never see his like again, and those who have known him longest will certainly not feel his loss least."

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—November 6th, 1891: Vice-Admiral VIGNES in the Chair.—After the reading of the correspondence, the Rev. Père Lejeune gave some information respecting the Fangs of the Congo, and M. Jules Claine read a paper upon his journey in the island of Sumatra and the Malacca Peninsula.

—November 20th, 1891: Vice-Admiral VIGNES in the Chair.—The Chairman announced that the Central Commission had established three groups of studies:—(1) Physical and mathematical geography, geology and general theories of the earth, oceanography; (2) ethnography, anthropology, zoological and botanical geography; (3) historical geography and the history of geography, economical and statistical geography.—M. C. Rabot communicated some news of the Danish Expedition to East Greenland, according to which the *Hekla* was, on the 2nd July, in N. lat. 71° 30' and W. long. 6° 30'; since then no direct news had been received from Lieut. Ryder, but the *Hekla* was sighted on the 26th July by the English whaler *Active* in lat. 72° 40' and long. 14° 45', steering a south-south-easterly course. It might be supposed that the *Hekla* had reached the east coast of Greenland under 71° 30'.—M. Rabot also gave an account of his voyage last summer to the Faroe Islands, Iceland, and the island of Jan Mayen. The expedition was undertaken at the instance of the Minister of the Marine, and had for its main object the exploration of the island of Jan Mayen, with special reference to the modifications which the glaciers had undergone since 1892, the date of the Austrian Expedition. After visiting the Faroe Islands and Iceland, the *Chateau-Renault*, with M. Rabot on board, steered for Jan Mayen, but when in sight of the island was compelled to retreat before the ice-floes. M. Rabot found comparatively warm water in this part of the glacial ocean, on one occasion, quite close to an iceberg, the temperature of the water was at the surface 45° (Fahr.).

NEW GEOGRAPHICAL PUBLICATIONS.

(By J. SCOTT KELTIE, *Librarian R.G.S.*)

EUROPE.

[**Murray's Handbooks.**].—A Handbook for Travelers in France. Part I. containing Artois, Picardy, Normandy, Brittany, the Seine and Loire; the Garonne, Bordeaux, Limousin, Gascony; the Pyrenees, &c., &c. Part II. containing Artois, French Flanders, Champagne [Lorraine, Alsace], and the Vosges, Burgundy; the Morvan, Lyons, Marseilles, and the Rhône, Franche-Comté and the Jura, Dauphiné, the French Alps, Provence, and Nice. 18th edition. London, John Murray, 1892: post 8vo, pp. (Part I.) [63] and 433, (Part II.) [32] and 425, maps and plans. Price of each part, 7s. 6d.

ASIA.

Archer, W. J.—Report on a Journey in the Me-Kong Valley, by Mr. W. J. Archer, First Assistant in Her Majesty's Consular Service in Siam. Folio, pp. 24.

In December 1890, the Government of India having determined on completing the exploration and survey of the frontier of Burmah with Siam (commenced in 1889 by the Anglo-Siamese Commission), Mr. Archer was placed in charge of the Kynington-Chiengmai Mission, which was to undertake the work on the remaining portion in the Me-Kong Basin. Leaving Chiengmai on the 10th of December 1890, the Mission struck north to Muang Tuen, and across the watershed of the Salwin and Me-Kong in a north-easterly direction to Muang-Sat, thence south down the valley of the Me-Khok to the frontier of Muang Fang. Their course was now north-easterly by Chienglap and the valley of the Nam Ma, a small unnavigable river that was unexplored and shown on maps as the Nam Ngun, to Muang Sing, the capital of Chiengkheung (Kyaing Chaing) territory, where the Mission was completed. At Muang Phong the Kynington-Chiengmai Mission broke up definitely, the survey party returning to Burmah, while Mr. Archer, with Captain Fulton, and a small party, started eastward for the journey into the Nam U and Me-Kong Valleys on his way to Bangkok, the latter place being reached on the 15th of May, 1891. It may here be mentioned that Lord Lamington accompanied Mr. Archer on this mission, as far as Chiengsen, on his enterprising journey eastward to Tonkin.* The report contains a deal of information on matters of general interest and importance, with useful notes on the geography of the country and descriptions of the people met with. A sketch map is given showing Mr. Archer's route.

Bonvalot, Gabriel—De Paris au Tonkin à travers le Tibet inconnu. Paris, Hachette & Co., 1892: pp. 510, with map and illustrations. Price 20 francs.

— Across Thibet, being a translation of 'De Paris au Tonkin à travers le Tibet inconnu.' Translated by C. B. Pitman. 2 vols. London, Cassell & Co., 1891: pp. xii. and 218, viii. and 230, with illustrations and map. Price 32s. [Presented by the Publishers.]

When M. Bonvalot returned to France after his remarkable journey across the Pamir in the winter of 1887, he had no idea of renewing his explorations, but looked forward to the enjoyment of well-earned repose and the reminiscences of many a danger past and difficulty overcome. But these plans were soon forgotten when that youthful and enthusiastic aspirant for geographical laurels, Prince Henry of Orleans, son of the Duc de Chartres, declared his ardent wish to travel with him in Asia.

Preliminaries were speedily arranged, and leaving all details as to the countries to be traversed, the routes to be followed, and the ultimate goal of their journey to be settled afterwards, the two companions set forth from Paris on the 6th July, 1889. In Russia they received a warm welcome and the

* Lord Lamington's paper appeared in the 'Proceedings' for December 1891, p. 701.

necessary letters to frontier officials. Travelling rapidly through Moscow and Nijni Novgorod, they descended the Volga to its confluence with the Kama, ascended this river to Perm, crossed the Ural Mountains and Western Siberia, and arrived at Semipalatinsk, where necessary purchases were made. At Jarkent, the last town on the Russian frontier, their caravan was finally organised, and at Kulja a third European, Father Dedeken, a Belgian missionary and good Chinese scholar, joined their party. The personnel of the expedition now comprised Prince Henry, Father Dedeken, and M. Bonvalot; Rukhmed, the faithful companion of two previous journeys; Bartholomews or Akhund, servant of the Father; and Abdullah, Prejevalsky's Taranchi interpreter. On the 12th September they left Kulja with the best wishes of the small European colony in that city, and turned their faces resolutely towards the inhospitable regions for many months to be the scene of their wanderings.

It was no light undertaking that they had entered upon—the young prince, born and nurtured in luxury, the more experienced author and journalist, and the worthy priest. They were about to attempt the solution of a geographical problem where so many had failed; they were going to penetrate the mysterious lama-governed Tibet; and, lastly, they would try and unite by a new and untried route Tonkin with St. Petersburg. M. Bonvalot, as he chronicles their adventures, mishaps, and successes, carries the reader with him, and every page of his book contains something new and entertaining. We follow him with unflagging interest along the valleys of the Upper Il, over the Celestial Mountains, across the desert of Gobi and the Tarim basin to Lob-nor, recognising many of the scenes and people described by Prejevalsky. Southward of the Amban-ashkan Pass he takes us by a new route, more direct than that of the Russian traveller and of Carey, a route by which the Kalmuk pilgrims travel to Lhasa. It leaves Tsaidam on the east, and leads due south over an uninhabited mountainous region of enormous height. Here there are no guides, no landmarks, nothing to show the road, save the tracks of an occasional caravan. Our travellers soon became adepts in the art of pathfinding, and no Indians could have shown a keener instinct in following up a trail than did these polished Frenchmen and their Belgian companion on the lofty plateaux of Tibet. The conditions of travel in these regions in winter are intense cold and dryness of atmosphere, violent winds, usually from the west and south-west, and all these exceedingly distressing symptoms produced by physical exertion at high altitudes. To face these and the murmurs of discontented followers who were being taken much further than they intended, required all the light-heartedness of a Frenchman combined with the fortitude of an ardent explorer. Every pool and spring being frozen, it became necessary to carry the supply of drinking water as ice, and several days' provision of fuel.

Having crossed the Christopher Columbus range by the pass already mentioned, the expedition entered an unexplored region, unlike any other perhaps in the world. They passed through the snowy-peaked Prejevalsky range and beyond it found innumerable craters of extinct volcanoes, frozen geysers and lava-covered plains. To some of the first they gave the names of "Ruyabrock" or "Rubruquis"—a compliment to their travelling companion—"de Bussy" and "Para." Among the many beautiful lakes they named one "Lac du binocle" and another much larger, "Montcalm"; a range of mountains was named "Crevaux," after the French explorer, and another to the south "Dupleix." On the 7th January they saw the first signs of inhabitants at a time when their hearts began to fail them, surrounded as they were by difficulties of every kind, for their position might well be compared with that of prisoners trying to escape by climbing one wall after another, each one higher than the preceding. Such for instance was the Dupleix range crowned with icy peaks rising to an apparent height of at least 20,000 feet above sea-level. It is in these mountains that M. Bonvalot places the sources of the Yang-tse-kiang. By the time they were approaching the inhabited tracts their forces were much weakened. One of their men had died, a second was too ill to stand, and several of their camels and horses had perished. But with hopes of soon obtaining the relief they sorely needed they pressed forward, Prince Henry leading the way, compass in hand, and at length on the last day of

January the first Tibetans were met and questioned. Evasive answers were returned, food was refused, and it soon became evident that orders had been given to admit no Europeans. Desperate men, prepared to sell their lives dearly, take no refusal, so when supplies could not be obtained by fair means, force was their last resort, and sheep and horses were unceremoniously seized from the wondering and frightened natives.

The shores of Lake Nantso, the Tengri-nor or Lake of Heaven of the Mongols, were at length in sight and the unknown region passed. They were the first Europeans to set eyes on this waterspread, first made known to us by the pundits (cf. *Journal R.G.S.*, vol. xlvii.). From the summit of the pass overlooking the lake, M. Bonvalot gazed on the Ningling Tangle Mountains, barring the distant view on the south. From their centre, four peaks rise majestically to a great height, the objects of reverence to the Tibetans, for behind them is Lha'sa, the city of spirits.

The last two hundred pages relate to the interviews with the officials sent from Lha'sa to treat with our travellers, and their further journey to Batang and into French territory. The book is exceedingly interesting throughout, and is one of the best narratives of travel we have read. Without any pretensions to be scientific, it contains many observations valuable to naturalists. In an appendix are given the names of plants and animals collected, while the illustrations from photographs taken by Prince Henry, add much to the work.

We feel so much indebted to Mr. Pitman for his opportune English version of the work reviewed above, that we are not disposed to be critical. We regret, however, that some of the dialogues in the original and especially the scientific appendix are omitted.—[E. D. M.]

[**The Himalayas.**—Memoirs of the Geological Survey of India, vol. xviii. Griesbach: Geology of the Central Himalayas. Calcutta, 1891, 8vo, pp. x. and 232 and xix.

Dr. Griesbach's memoir will, no doubt, become an indispensable authority to the student of the physical geography of the Himalayas. While the bulk of the memoir deals with the geology of the region, a considerable section is devoted to the physical features. There are numerous photographs, admirable from the geographical standpoint, as well as a large supply of maps. With regard to the question of the proper application of the name Himalayas, Dr. Griesbach refers to the opinions of previous writers, Hodgson, Strachey, Saunders, Markham, Blanford, Medlicott. Following the example of the authors of the 'Manual of the Geology of India,' Dr. Griesbach adopts the following classifications:—(1) Sub-Himalayas (Swatika, &c.). (2) Lower or Outer Himalayas. (3) Central Himalayas, consisting of (a) Southern range (line of great peaks); (b) Northern range (line of water-parting). (4) Tibetan Plateau with ranges. (5) Kuen-lun Mountains. Dr. Griesbach has some interesting remarks on the glaciers of the Himalayas. Nearly every one of the high valleys situated within the limits of perpetual snow has its glacier. Some of them are of very large proportions; for instance, one of the Raskana glaciers near Niti is $7\frac{1}{2}$ miles long, the other 8 miles long. The Nanda Devi is surrounded by glaciers; two, which descend from the mountain mass on its north side, are respectively 12 and 14 miles long, whilst the Bagini Glacier is 10 miles, and the Kosa $7\frac{1}{2}$ miles long. Several very large glaciers are found in the Muna and Gangotri area; the three branches of the Gangotri glacier are respectively 14, 15, and 5 miles long. The Muna glacier, a large sheet of ice and moraines, is fully 15 miles long. Dr. Griesbach refers to General Strachey's excellent account of the Pindari Glacier (*Jour. As. Soc. Beng.* xvi. and xvii.) as being a summary of what may be said of the glaciers of the Himalayas. Although there is a remarkable absence of striated and polished boulders among the Himalayas, and of traces of former glaciation, still Dr. Griesbach has no doubt that in past epochs the ice came much lower down than it does now. At the same time he adduces one or two very remarkable instances of undoubted ice-action.

[Murray's Handbooks.]—Handbook for Travellers in Syria and Palestine, including a short account of the Geography, History, and Religious and Political Divisions of these countries, together with detailed descriptions of Jerusalem, Damascus, Palmyra, Baalbek, and the interesting Ruined Cities of Moab, Gilead, and Bashan. London, John Murray, 1892: 12mo, pp. lii. and 403, maps and plans. Price 18s.

This is an entirely new edition of the handbook for Syria and Palestine. It has for the most part been rewritten, and by omitting the portion relating to the Wilderness of Sinai, the information has been brought into one compact volume. The introduction contains a short sketch of the physical and political geography of the country; a historical summary; chronological table; and notes on the inhabitants and climate of Syria and Palestine.

AMERICA.

[Canada.]—Geological and Natural History Survey of Canada. Alfred R. C. Selwyn, C.M.G., LL.D., F.R.S., Director. Annual Report (New Series) vol. iv. 1888-89. Montreal, W. F. Brown & Co., 1890: 8vo.

This volume contains, after the usual Summary Reports of the Operations of the Geological Survey for the year 1889, by the Director, a Report on a portion of the West Kootanie District, British Columbia, by G. M. Dawson; Report on an exploration in the Yukon and Mackenzie Basins, by R. G. McConnell. Among the more important geographical results of the exploration may be mentioned the traverses of the Liard from Dease River to the Mackenzie, of the lower part of Hay River, of the Rocky Mountains, by the Peel River Portage, and of Bell River and the Porcupine, from Lapierre House to Fort Yukon. A sketch traverse of the Mackenzie, from Fort Simpson to the mouth of Peel River, was also made. Another result of the exploration of some interest to the geographer is the discovery of a great break in the continuity of the Rocky Mountains in about lat. 60° N. The range here is suddenly jogged eastward for a couple of degrees, and is then continued northward along nearly the same bearing as before. Mr. Warren Upham contributes a Report of Exploration of the Glacial Lake Agassiz in Manitoba, which contains some useful notes on the topography of this region. Among other reports contained in this volume may be mentioned:—On the Mineral Resources of the Province of Quebec, by R. W. Ellis; on the Surface Geology of Southern New Brunswick, by R. Chambers; Reports for 1888, Mining and Mineral Statistics of Canada, by H. P. Brumell; Reports for 1889, Division of Mineral Statistics and Mines, by E. D. Ingall and H. P. Brumell; and, Annotated List of the Minerals occurring in Canada, by G. C. Hoffmann. The Report, as usual, contains a number of fine maps and sections, besides plates.

GENERAL.

Gore, J. Howard.—Geodesy. Heinemann's Scientific Handbooks. London, W. Heinemann, 1891: pp. 218. Price 5s. [Presented by the Publishers.]

This little book, which forms one of Heinemann's series of scientific handbooks, contains a well written popular account of the science of geodesy. The author commences with chapters on primitive notions and primitive determinations, which are extremely interesting, as showing the progress made in geodesy between the sixth century before Christ and the early part of the sixteenth century, when Fernel published the results of his measurements of a degree of latitude to the north of Paris. In chapter iii. Mr. Gore gives an account of the work of Willebrord Snell and his introduction of the system of triangulation from a known base, and from this proceeds to deal in turn with the progress of geodesy up to the present date. The style in which this book is written is remarkably clear, and it will be useful as a preparatory work for higher studies in the same branch of science.—[J. C.]

Günther, [Dr.] Siegmund.—*Lehrbuch der physikalischen Geographie. Mit Abbildungen und Tafeln.* Stuttgart, Ferdinand Enke, 1891: 8vo, pp. xii. and 508. Price 10s. 6d.

The object of the author in this book is to give a review of the present state of the science of physical geography. Commencing with the astrophysical basis of physical geography the author deals with the nature of comets, meteorites, and other celestial bodies, referring especially to the recent results of stellar and solar spectroscopy. Then he explains the law of gravitation and the geographical problems connected therewith, and proceeds by entering into geological details, which he considers essential to the study of physical geography, which are, however, fully treated of in the handbooks of geology. Upheaval and subsidence of the land, volcanic action and earthquakes are spoken of, and the magnetical and electrical properties of our planet explained, especially the most modern views and experiments regarding the electrical nature of the aurora borealis. Then the author gives a description of atmospheric and climatological phenomena, and some interesting chapters on the statics and dynamics of the oceans, the hydrography of continents, the physical geography of snow and ice, and of other agents, which produce geographical changes in continents and oceans. The author deals in conclusion with the morphology of the surface of the earth, giving an account of the orographical problems of physical geography, the formation of valleys, the changes of river beds, and the classification of lakes, coasts, and islands, &c. Although the volume does not claim to bring forward new investigations and information, yet its clear and exhaustive treatment of so difficult a subject-matter makes the book valuable, especially to students.—[H. S.]

Kollm, G.—*Verhandlungen des Neunten Deutschen Geographentages zu Wien am 1., 2., und 3. April 1891. Mit 9 Figuren und 2 Karten.* Berlin, Dietrich Reimer, 1891: 8vo, pp. liii. and 402. [Presented by the Publisher.]

A series of papers, mostly on questions of geographical importance, was read in the course of this meeting, which was held in Vienna last year. Various papers dealt with the geography, ethnology, and geology of different parts of the Balkan Peninsula, showing the keen interest of Austrian scientific and military geographers for these countries. Professor Neumayer read an interesting paper on the importance of systematic magnetic observations, and Professor Penck spoke about the different forms of "land-surfaces." Professor Kirchhoff gave a report of the progress of local German geography during the preceding two years, suggesting the formation of a "*Gesellschaft für deutsche Landeskunde*," which no doubt would be of great value for the progress of local geography in Germany. Educational geography was represented by several papers which dealt, however, partly with questions of mere detail. Professor Umlauf pointed out that it is not sufficient in educational geography to use maps, globes, armillary spheres, &c., but that regular geographical collections should be made use of (analogous to those employed in the teaching of natural history), comprising products, articles of industry and commerce, ethnological as well as landscape photographs and pictures, models of dwellings, instruments, weapons, &c.—[H. S.]

Poussié, [Dr.] E.—*Manuel de Conversation en Trente Langues. Troisième édition.* Paris, H. Le Soudier, 1891: oblong 16mo, pp. xx. and 204. Price 10 francs. [Presented by the Author.]

This little manual consists of the alphabet, grammar, vocabulary, and a collection of short sentences in thirty different languages, Continental and other, systematically arranged.

NEW MAPS.

(By J. COLNS, *Map Curator n.o.s.*)

ASTRONOMICAL.

Astronomical Geography.—Yazg's Astronomical Diagrams for Schools. Western Publishing House, Chicago, U.S.A. Price 3l. 10s. (*Philip.*)

This is a very nicely prepared set of diagrams, illustrating astronomical phenomena, and will doubtless be useful to teachers in conveying to the minds of their pupils an idea of their causes. They are accompanied by a book containing instructions and exercises.

WORLD.

Audry, C.—Carte des Communications Postales Maritimes des Lignes Télégraphiques du Globe, avec l'indication des pays où il peut être expédié des Colis postaux. Dressé d'après des documents officiels par C. Audry, Géographe à la Direction générale des Postes et Télégraphes. Paris 1891. Mercator's Projection. With inset maps. Price 11s. (*Philip.*)

Flemming, Carl.—Östliche Halbkugel. Scale 12° to an inch (Equatorial). Entworfen von F. Handtke. Carl Flemming's Generalkarten No. 49. Druck und Verlag von Carl Flemming in Glogau. 3. Auflage. Price 1s. (*Williams & Norgate.*)

—— Westliche Halbkugel. Scale 12° to an inch (Equatorial). Entworfen von F. Handtke. Carl Flemming's Generalkarten No. 50. Druck und Verlag von Carl Flemming in Glogau. 3. Auflage. Price 1s. (*Williams & Norgate.*)

On each of these hemispheres, all lines of communication by steamer and international telegraph are laid down, and the most important railways are shown. They are good maps, of their class, and remarkably cheap.

Supan, Alexander.—Tiefsee-Forschungen in den Jahren 1888 bis 1890. Von Alexander Supan. Petermann's 'Geographische Mitteilungen,' Jahrgang 1892, Tafel 4. Gotha, Justus Perthes. (*Dulau.*)

EUROPE.

British Isles.—New Reduced Ordnance Map of the —, by John Bartholomew, F.R.G.S. Scale 1:633,360 or 8·6 geographical miles to an inch. Published by George Philip & Son, London and Liverpool. Price, in sheets, 1l. 5s.; on rollers, varnished, 1l. 11s. 6d. [Presented by the Publishers.]

This map is a reduction, on the scale of 10 miles to an inch, of the Ordnance Survey of the British Isles. The work shown on the Ordnance Survey maps has, where requisite, been supplemented to the present date with all new railways, stations, villages, and hamlets. Inset maps are given showing the parliamentary divisions of the country, together with special enlargements of the principal towns and seaports. This map has been produced in a remarkably clear style; the principal elevations are indicated, but otherwise the relief of the country is not shown. Thus, for the purposes of general reference, adds to the value of the map, as it is not obscured by hill-shading.

Iceland.—Geologische Karte eines Theiles des inneren Island. Nach eigenen Aufnahmen in den Jahren 1888 u. 1889, gezeichnet von Th. Thoroddsen. Scale 1:600,000 or 8·2 geographical miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1892, Tafel 3. Justus Perthes, Gotha. (*Dulau.*)

Sardegna.—Carta generale della —, con speciale indicazione delle reti stradali e delle nuove circoscrizioni amministrative ed elettorali, disegnata e pub-

Sambalpur (Malkhorada and Chandrapur—Padampur Zamindaries). Seasons 1884-87. No. 237, District Sambalpur (Chandrapur—Padampur Zamindari). Seasons 1881-87. Nos. 238, 239, 251, 252, 253, 262, 263, 264, 265, District Sambalpur. Seasons 1884 to 87.—North West Provinces and Oudh Survey. 1 inch to a mile. Sheet 168, Districts Mirzapur and Jaunpur. Seasons 1884-68. No. 188, Districts Basti and Gorakhpur. Seasons 1885 to 88. No. 190, Districts Gorakhpur and Basti. Seasons 1884 to 87. No. 197, Districts Benares and Mirzapur. Seasons 1880 to 84 and 87-88. Nos. 203, 213, 214, 215, District Gorakhpur. Seasons 1884 to 87.—Oudh Revenue Survey. 1 inch to a mile. Sheet No. 99, District Kheri. Seasons 1865-67. No. 145, District Bahraich. Seasons 1866-68. No. 159, Districts Bahraich and Gonda. Seasons 1866-71. No. 173, District Gonda. Seasons 1869-71.—Lower Burma Survey. 1 inch to a mile. Sheets Nos. 7, 8, 9, 10, 25, 26, 27, 28, 43, 44. District Akyab. Seasons 1883 to 87. No. 46, Districts Akyab and Kyauk Pyu. Seasons 1883 to 87. No. 180, Districts Promé, Henzada and Tharrawaddy. Seasons 1882 to 83 and 1885 to 89. No. 228, Districts Promé and Tharrawaddy. Seasons 1881-82 and 83. No. 276, District Tharrawaddy. Seasons 1883 to 85. No. 277, District Tharrawaddy. Seasons 1882 to 86. No. 278, District Hanthawaddy and Tharrawaddy. Seasons 1880 to 84. No. 282, Districts Pegu and Hanthawaddy. Season 1881-82. No. 283, District Hanthawaddy. Season 1881-82. Nos. 323 and 324, District Shwegyin. Season 1884-85. No. 325, Districts Pegu and Shwegyin. Seasons 1883 to 85. Nos. 327 and 328, District Pegu. Seasons 1880 to 83. [Presented by H.M. Secretary of State for India, through the India Office.]

AFRICA.

Afrika.—Spezial-Karte von —, im Maassstab von 1:4,000,000 or 55·5 geographical miles to an inch, (10 Blatt) entworfen von Hermann Habenicht, bearbeitet von demselben, Bruno Domann und Dr. Richard Lüddecke. Dritte Auflage, 11.^e Lieferung. Price 3s. (Dulau.)

Section 2, in its northern limit, includes the coast of the Mediterranean from Algiers to Alexandria, and to the south, the Central Sahara as far as the 21st degree N. lat. The routes traversed by explorers are laid down, and the date when each journey was made is given. The greater part of Section 3 is occupied by the title and explanatory notes; the remainder by the coasts of the Red Sea, and the country bordering on the Nile, from the shores of the Mediterranean to Berber.

— Karte von — von R. Andree und A. Scobel. Scale 1:10,000,000 or 133·3 geographical miles to an inch. Ausgeführt in der geographischen Anstalt von Velhagen und Klasing in Leipzig. Neuer revidierter und vermehrter Abdruck 1892, mit einer neuen Nebenkarte: Deutsch Ostafrika im Maassstab 1:5,000,000 und mit Spezialkärtchen der übrigen Deutschen Besitzungen sowie einem Namenverzeichnis aller in der Karte von Afrika vorkommenden Namen. Bielefeld und Leipzig. Verlag von Velhagen and Klasing, 1892. Price 5s. [Presented by the Publishers.]

This map having already gone through several editions, is now thoroughly revised and brought up to date. It exhibits all political boundaries, and the results of recent explorations. In addition to the principal map, five insets are given, the largest of which is one of the German Possessions in East Africa. The lettering is remarkably clear, and the map, which is an excellent specimen of cartography, is accompanied by a copious index which materially enhances its value for the purposes of general reference.

Kamerun.—Karte der Reisen von Premierlieut. Morgen im Hinterland vom — in den Jahren 1889-1891, in Verbindung mit einer Neukonstruktion der Routen

der Kund'schen Expeditionen 1887-89. Scale 1:1,000,000 or 13·6 geographical miles to an inch. Bearbeitet v. E. Mayr. Mitth. a. d. deutschen Schutzgebieten, Band IV, Tafel VIII. (Dulau.)

Marokko.—Das Sultanat —. Entworfen und gezeichnet von Paul Schnell, 1890. Scale 1:1,750,000 or 23·9 geographical miles to an inch. With an index. Umgebung von Marokko. Scale 1:1,000,000 or 13·6 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Ergänzungsheft No. 103. Gotha, Justus Perthes. (Dulau.)

Nil-Länder.—Die —. Scale 1:6,000,000 or 82·2 geographical miles to an inch. Carl Flemming's Generalkarten No. 42. Druck und Verlag von Carl Flemming in Glogau. 4. Auflage. Price 1s. (Williams & Norgate.)

Tunisie.—Carte de Reconnaissance. Scale 1:200,000 or 2·7 geographical miles to an inch. Carte dressée à l'aide des itinéraires et des levés à vue exécutés de 1881 à 1887. Publiée par le Service Géographique de l'Armée. Sheets:—No. I. Tabarca; II. Bizerte; III. Cap Bon; IV. Souk el Arba; V. Tunis; VI. La Goulette; VII. El Kef; VIII. Mactar; IX. Sousse; X. Thala; XII. El Djem; XIII. Feriana; XIV. Sbetta; XV. Sfax; XXIII. Gabès. Price 7d. each sheet. (Dulau.)

Witwatersrand Gold-Field, S.A. Republic.—General Plan showing the Main Reef Properties. Compiled from authentic information and actual survey by Ewan Currey and Burton Tucker, Government Surveyors, S.A.R., August 1891, and lithographed at Stanford's Geographical Establishment for C. S. Goldman, Johannesburg. Scale 1:29,779 or 2·4 inches to a geographical mile. London, E. Stanford, 1892. Price, in sheets, 12. 1s. [Presented by E. Stanford, Esq.]

This map consists of three sheets, upon which the boundaries of the farms are shown, and the Mijnpachts, and claims, clearly distinguished by colours. The main reef, so far as it has been proved, is given in a firm red line, and its probable extensions, in broken red lines. Occupation grounds, townships, and the Boksburg Railway are shown. The names of the companies in each farm, with the number and extent of their claims, the dip of the reef on the claims, and other particulars, are given in tabulated form. The manner in which the map has been produced leaves nothing to be desired, and it will, no doubt, be extremely useful to all persons interested in these gold-fields.

AMERICA.

Vereinigten Staaten.—Karte der — von Nordamerika. Bearbeitet von F. Handke. Scale 1:6,000,000 or 82·2 geographical miles to an inch. Carl Flemming's Generalkarten No. 40. Druck und Verlag von Carl Flemming in Glogau. 26. Auflage. Price 1s. (Williams & Norgate.)

AUSTRALASIA.

Egum Group, British New Guinea.—Scale 1:63,360 or 0·86 geographical mile to an inch. Surveyor-General's Office, Briabane. Enclosure in Despatch No. 51 of 1890.

Sumatra.—Kartenskizze eines Theils von Mittel —, mit den geplanten Eisenbahnlirien von der Küste zu den Ombillen-Kohlenfeldern. Scale 1:500,000 or 6·8 geographical miles to an inch. Deutsche Geographische Blätter. Band XIV. Tafel 2. Kommissionsverlag v. G. A. v. Halem in Bremen. [Presented by Dr. M. Lindeman.]

CHARTS.

French Charts.—Nr. 4543, Baie de Phalère. Grèce. Golfe d'Athènes, 1891.—4599, Plateau des Minquiers. Entrée de la Déroute. Côte Nord de France, 1891.—4523, Rivière Ikoï. Estuaire du Gabon. Côte Ouest d'Afrique, 1891.—4479, Baie des Iles. Terre Neuve. Côte Ouest, 1891.—4555, Côte Sud de St. Domingue de la Baie d'Aquin à la Baie aux Cayes, 1891.—4489, Iles Chatham. Océan Pacifique Sud, 1890. Service Hydrographique de la Marine, Paris. [Presented by the Service Hydrographique de la Marine, Paris.]

ATLASES.

Bartholomew, J. G., F.R.G.S.—The Globe Hand Atlas. A Series of fifty-four fully-coloured Maps of the World, with Index and Population of the Principal Countries and Cities of the World, according to Recent Census Returns. By J. G. Bartholomew, F.R.G.S. London, T. Nelson & Sons. Price 2s. 6d. [Presented by the Publishers.]

In addition to the fifty-four maps which this little Atlas contains, a diagram showing the differences in time between sixteen important places and Greenwich, is given, together with a plan illustrating geographical terms, a table of the population of the principal countries and cities of the world, compiled from the most recent data, and a copious general index.

Berghaus' Physikalischer Atlas.—(Begründet 1836 von Heinrich Berghaus). 75 Karten in sieben Abteilungen, enthaltend mehrere Hundert Darstellungen über Geologie, Hydrographie, Meteorologie, Erdmagnetismus, Pflanzenverbreitung, Tierverbreitung und Völkerkunde. Vollständig neu bearbeitet und mit Mitwirkung von Dr. Oscar Drude, Dr. Georg Gerland, Dr. Julius Hann, Dr. G. Hartlaub, Dr. W. Marshall, Dr. Georg Neumayer, und Dr. Karl v. Zittel. Herausgegeben von Prof. Dr. Hermann Berghaus. Vierundzwanzigste Lieferung. Inhalt: No. 1, Höhen und Tiefen; No. 14, Süd-Amerika, geologisch; No. 63, Religionen. Titel und Vorbemerkungen zum Atlas der Völkerkunde. Gotha, Justus Perthes, 1891. Price 8s. each part. (*Dulau.*)

Sheet No. 1 contains two hemispherical maps showing the heights and depths of the world, sections drawn on equal vertical and horizontal scales, and diagrams illustrating the greatest and mean heights of the eastern and western hemispheres. No. 14 is a geological map of South America, with seven insets on an enlarged scale. Sheet 63 contains two elliptical maps of the religions of the world. This sheet completes Dr. Gerland's "Atlas der Völkerkunde," and is accompanied by the title-page, letterpress, and index.

Universal Atlas.—The —, complete in twenty-eight parts, including index. London, published by Cassell & Co., Limited, for the Atlas Publishing Co., Limited. Part 11. Price 1s. [Presented by the Publishers.]

Sheet 63 is a map of Northern Italy, on which all means of communication are laid down. Sheet 64 contains an ethnographic map of the Balkan Peninsula, on which the colours used to distinguish races are well chosen and effective, and a map of Constantinople and the Sea of Marmara. On sheet 94 a very nicely drawn general map of the United States is given.

PHOTOGRAPHS.

Alps.—Nine Photographs of the —, taken by Signor V. Sella, 1891. (*Spooner.*)

These are a few photographs out of a large series taken last year by Signor V. Sella, the photographer of the Caucasus, in the Trentine and Venetian Alps, illustrating the peculiarly bold outlines and strange structure of dolomitic limestone. The groups depicted are that of Val Rendena, north of Lago di Garda, first made known to Englishmen by Mr. John Ball, and the better-

known summits of Primiero and Cortina. Serrated ridges and fantastic pinnacles are the characteristics of these mountains, and their forms are often more incredible than the peaks of the most "romantic" landscape-painters. In addition to these there is a very curious view of the Marjelen See—the icelake of the Aletsch Glacier—taken after its waters have flowed off through the breaking open of a new subglacial channel. The strange black tunnels in the ice appear to be disused water-channels. The ordinary level of the water is shown by the line of stranded ice.

Himalayas.—Sixteen Photographs of the Peaks and Glaciers of Kinchinjanga, &c., taken by Messrs. Johnston and Hofmann, Darjiling. (*Spooner.*)

We have had many views of the snows from the neighbourhood of Darjiling. Dr. Boeckh, a German, has carried his camera up to the great range, and given in the 'Transactions' of the Deutschen Alpenverein (1891) some excellent illustrations of Himalayan scenery, and M. de Döehly has taken a few views of or near the snows. But the views here shown, taken by Darjiling photographers, Messrs. Johnston and Hofmann, are the first of any importance, published in England, that display as seen close at hand—from levels, that is, of 16,000 to 18,000 feet—the peaks and glaciers of Kinchinjanga.

They may be compared to the Alpine views of Monte Rosa from the Monte Moro and similar heights taken by Bisson Frères twenty-five years ago, and are interesting as illustrating the close correspondence pointed out by Dr. Hooker between the Alps and the Himalaya in the main features of their glacial scenery.

Jamaica.—Album of Photographs illustrating the Scenery of —, taken by Dr. J. Johnston.

This series consists of forty-two photographs of the scenery of the Island of Jamaica, and contains some excellent illustrations of tropical vegetation.

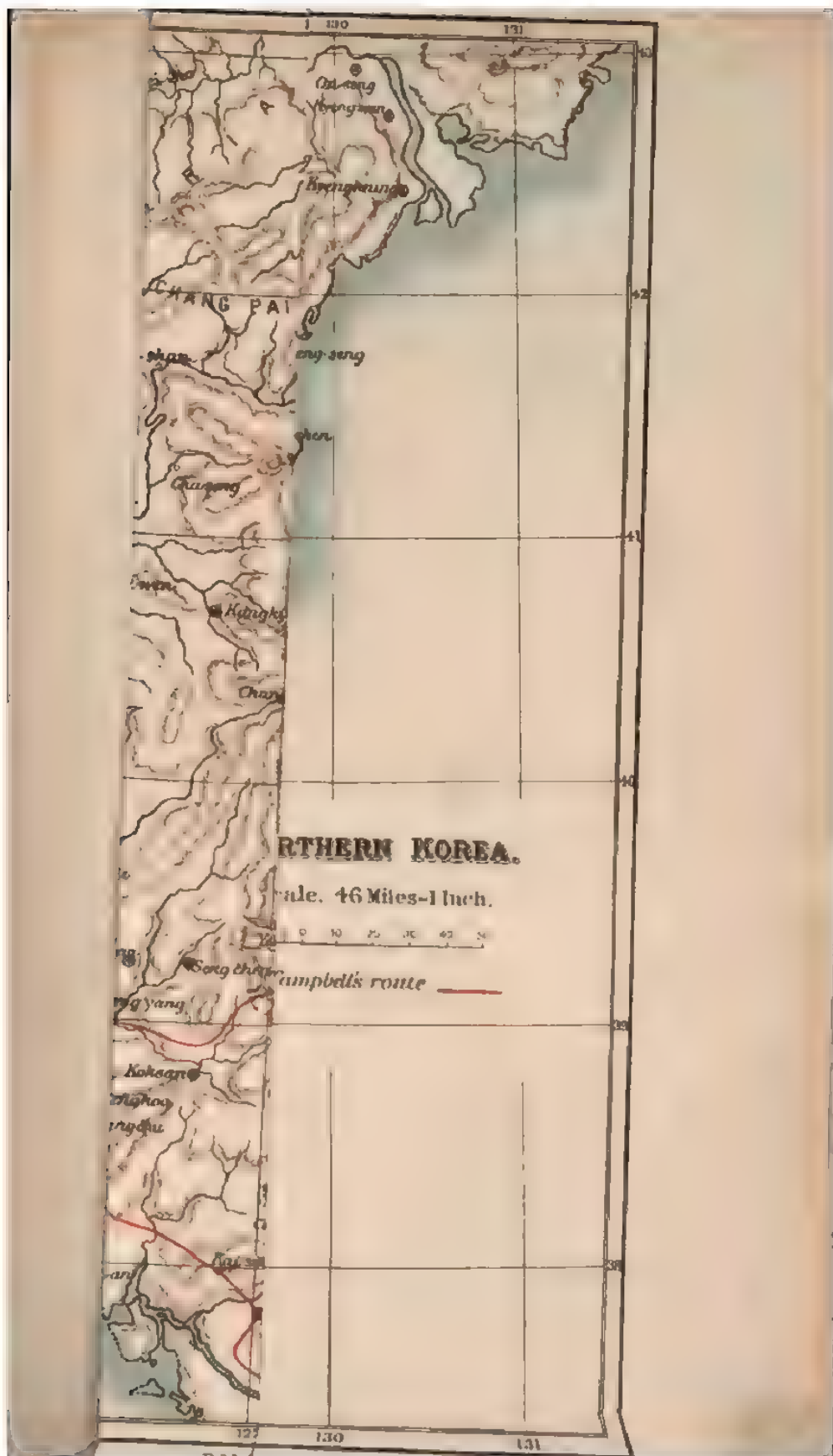
Korea.—Thirty-two Photographs of —, taken by C. W. Campbell, Esq., 1889, and presented by him to the Royal Geographical Society.

This is an interesting series of photographs, illustrating the characteristics of the people, and the scenery of Korea.

Palestine.—Fifty-five Photographs of Scenery in —, taken by G. Robinson Leas, Esq., F.R.G.S., 1891. [Presented by G. Robinson Leas, Esq.]

This set is a welcome addition to the Map Room collection, which contains very few photographs of Palestine.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given. In response to this notice many valuable photographs have been presented; the collection, however, is at present far from being complete, one of its greatest deficiencies being the entire absence of any photographs of Asia Minor.





PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Journeys in the Pamirs and adjacent Countries.

By Captain F. E. YOUNGHUSBAND, C.I.E.

(Read at the Evening Meeting, February 8th, 1892.)

Map, p. 272.

THE region I now wish to describe to you is that lying to the north of Kashmir, which from the height, the vastness, and the grandeur of the mountains, seems to form the culminating point of western Asia. When the great compression took place this seems to have been the point at which the solid crust of the earth was scrunched and crushed together to the greatest extent. What must have formerly been level peaceful plains, such as we see to the present day on either hand in India and in Turkistan, were pressed and upheaved into these mighty mountains, the highest peaks of which are only a few hundred feet lower than Mount Everest, the loftiest point on the earth. It was amongst the peaks and passes, the glaciers and torrents of this awe-inspiring region, and over the plain-like valleys and by the still, quiet lakes of the Pamirs that my fate led me in the journeys which I have now come before you to describe.

Lonely, desolate, and inhospitable as these mountains for the most part are, one may still find secluded valleys cut deep down into the mountain masses where some hardy hill-men till the ground and form villages. Among the most remote of these is the little state which on the Kashmir side is generally known by the name of Hunza, and on the north is usually called Kanjut. Hidden deep in the inmost recesses of these almost impenetrable mountains, this little state long withstood the tides of conquest which have surged around it. Its chiefs claim descent from Alexander the Great, its language is one of the most original extant, and its very name—Hunza—has suggested to some that this secluded little valley must be the cradle of the famous Hun race. Secure among their mountain fastnesses as they have been till they this winter rashly forced the British Government to take action against

them, the Kanjutis have for centuries raided on all the defenceless inhabitants within reach. They have carried into slavery with equal impunity the Kirghiz of the Pamir and the peaceful inhabitants of Baltistan and Gilgit; they have attacked caravans as far off as the road from Yarkand to Leh, and even as recently as last autumn they robbed a Kirghiz settlement on the Pamirs only eight miles below where I was myself at the time encamped. An unusually daring attack on a caravan coming from Yarkand to Kashmir attracted more than ordinary attention, and in the summer of 1889 I proceeded along the road from Kashmir to the spot where the raid was committed, intending thence to find my way back to India by Gilgit. An escort of six men of the 5th Gurkhas accompanied me, and leaving Abbotabad, the cantonment of their regiment in the Punjab, on July 11th, we reached Leh, the point at which we would have to make our final arrangements, on the 31st of the same month.

Then it was that those difficult and embarrassing problems which come as nightmares to explorers as well as to generals—the problems of transport and supplies—had to be solved. Since the days when Shaw and Hayward pioneered the route to Yarkand, that road and some of the country to the westward has been traversed by members of the Forsyth Mission and others, and my own observations when journeying from Yarkand to Kashmir by the Mustagh Pass in 1887, had given me an idea of the sort of country I should now have to travel through. But one point became abundantly evident, that I should be unable to obtain any supplies whatever in the country which lies between the Yarkand road and Hunza; and as I wished not merely to explore the single route to Hunza, but also to see something of the country round—the nature of the glaciers on the northern slopes of the Mustagh, the course of hitherto unexplored rivers, and the trend of the mountain ranges—I had to be prepared to go for many weeks together without reaching any inhabited spots and to be dependent on my own resources for supplies. At Shahidula I calculated upon obtaining from Yarkand territory as much flour and grain as I might require, but beyond that place I could not count on being able to supply myself for seventy days.

Captain Ramsay, the British Joint Commissioner, gave me every possible assistance in making our arrangements, and we left Leh on August 8th. Our first objective point was Shahidula, the spot near which the Kanjutis had committed the raid of the previous year. This place is situated on the trade route to Yarkand, and is 240 miles distant from Leh. The route is well known, and it is only necessary, therefore, to mention that four passes ranging from 17,500 to 18,500 feet above sea-level have to be crossed, and that for 170 miles no supplies are obtainable, and even grass and fuel are extremely scarce. The road is, however, practicable for ponies, and in the autumn months especially is

much frequented by traders between Yarkand and Leh, though the rarefaction of the air causes great distress to both ponies and men, and the route is strewn with the skeletons of animals which have succumbed to the hardships of the road. Near the highest pass—the Karakoram—snow fell heavily, and although we were still in August, when in the plains of India, which we had left only a month before, the thermometer would have been something like 110° in the shade, we found here the cold great enough at night to freeze small streams.

Shahidula was reached on August 21st. Here we halted a fortnight, and then having obtained supplies from the neighbourhood of Kilian, and secured a guide for the road to Hunza, we left again on September 3rd to explore the country up to the Tagh-dum-bash Pamir. The party at starting consisted of 8 Garkhas (gnarls); 1 orderly and surveyor; 1 interpreter (an Argoon of Leh); 1 cook (a Ladaki); 2 Balti raftmen (in charge of a mussuck raft); 5 Kirghiz; total 16 men, with 19 ponies (besides those which the Kirghiz rode), and 13 camels.

The route now led up the valley of a river, on which were several patches of fine grazing, and till last year this had been well inhabited, but was now deserted on account of Kanjuti raids. The valley is known by the name of Khál Chuskún. Chuskún in Turki means resting-place, and Khál is the name of a holy man from Bokhara, who is said to have rested here many years ago. The mountains bounding the north of this valley are very bold and rugged, with fine upstanding peaks and glaciers; but the range to the south, which Hayward calls the Aktágh Range, was somewhat tame in character, with round mild summits and no glaciers. The Sukhbulak is an easy pass, and from its summit to the east could be seen the snowy range of the western Kuenlun Mountains, while to the west appeared a rocky mass of mountains culminating in three fine snowy peaks which Hayward mistook as belonging to the main Mustagh Range, but which in fact in no way approach to the height and magnificence of those mountains. They really belong to the Aghil Range, which is separated from the Mustagh Mountains by the valley of the Oprang river.

On the 5th September we made a short march of 11 miles to Kulanudi, a camping-ground called by this name on account of a kulan, or wild ass, having once been found dead there. The weather at this time was delightful, very clear and bright, neither too hot nor too cold—just perfection for travelling. The route, too, was easy and level, leading down the broad pebbly bed of the Yarkand river. The snowy peaks of the Kuenlun Mountains rose up to a height of 21,000 or 22,000 feet to the north, but the real summit of the Aghil Range to the south could only be seen occasionally in peeps up narrow ravines. Far down the valley of the Yarkand river to the westward could be seen a very prominent knot of peaks, the height of which was approximately fixed by Hayward at 23,000 feet. On the following day we passed the camping-

ground of Chiragh-saldi, and struck the route which I had followed in 1887.

The next day, September 7th, the valley narrowed considerably, and, as the stream runs at places between enormously high perpendicular cliffs, it is necessary to be constantly crossing and recrossing the river, which gets deeper and deeper as streams from either side add to its volume, till it at last becomes too deep to be forded by laden ponies, and we were brought to a standstill at the same gorge where I was delayed two years ago. The river at this point was up to the ponies' backs and flowing with a strong rapid current over a rocky bottom, so that to take our baggage over on ponies was out of the question. We had to halt for the night and wait till the morning, at which time the river is always less deep than during the daytime, for then its volume is increased, owing to the sun melting the snows.

On this march we passed some ruins on a grassy plain called Karash-tárim (i. e. the cultivated lands of Karash, a man who is said to have lived here some eighty years ago). There were remains of half a dozen huts and some smelting furnaces, and there were also signs of furrows where land had been cultivated. This strip of grass and jungle was over half a mile long and 600 yards broad, and doubtless in former times was a flourishing spot. There were evident signs, too, of the existence of minerals; copper and iron, and possibly gold too, in small quantities, may be found, for quartz and pieces of iron ore were abundant. There are many traditions of the presence of minerals in these mountains, and the name of the country Raskam, a corruption of Rástkán (a real mine), clearly shows that minerals may be expected.

I had been exploring a side-valley during the day but overtook my party at dusk, just as they were stopped at the gorge mentioned above. The river was dashing along at a furious rate over huge rocks and boulders, and was quite impassable for the ponies; so we were compelled to halt for the night, and the next morning selected a place where the river bottom was least rugged, and crossed the river on camels, halting a few miles on the other side of the gorge, at a pleasant little camping-ground called Karúl, at the junction of the Surakwát stream. Here there was plenty of thick green grass and shrubs quite twenty feet high; so we remained here the following day also, that the ponies might have a good feed of grass, the like of which they would probably not see for a long time to come.

One of the Kirghiz took me a few miles lower down the river and showed me two equally good camping-grounds. He says there is considerably more pasture in the lower part of this valley than in that of the Kúrákash river, and that in old days the valley used to be populated and cultivated, and merchants used to go to and fro by the Mustagh Pass to Baltistán. Kanjuti raids, however, put a stop to this, and a story is told of a great raid which took place at the gorge. The Kanjútis lay hid on the cliffs overhanging the river, and as a man

called Khoja Mohammed was passing through with his family and a large party, the Kanjútis fired down on them, and afterwards attacked them with the sword, killing all the men, and taking the women and children captive. Since that time the gorge has always been known by the name of Khoja Mohammed.

We now had to leave the valley of the Yarkand river and cross the Aghil Range into the valley of the Oprang river. I took the camels on one day's march further to the foot of the Aghil Pass, and then sent them back to Shahidála to bring on the second instalment of supplies, which I had arranged should be brought to meet me at Chong Jangal, near the junction of the Oprang with the Yarkand river. The ascent of the Surakwát stream towards the Aghil Pass is in parts very difficult, as the valley narrows to a gorge, and at two places we had to spend some hours in building up a staircase to enable the ponies to get round steep rocky cliffs. The numerous boulders, too, with which the valley bottom is strewn, make it very trying work for the ponies; but we eventually emerged on to a small plain, at the further end of which the main summits of the Aghil Range rise up like a wall in front, rugged and uncompromising. Here we passed the same rock behind which, in 1887, I had spent the night lying in the open, as I had always been obliged to do during my passage of these mountains, for fear of attack from Kanjútis should I make my presence known by setting up a tent. On that night my guides, who had not been by the route for many years, had forgotten whether we should ascend a stream to the right, or another one on the left. If we had taken the wrong one we should have been lost in the mountains, as the range is only passable at one point, the Aghil Pass. We fortunately took the proper course, and now again retracing my former footsteps, on September 11th we crossed the remarkable depression in the range which is known as the Aghil Pass.

From here is obtained one of the grandest views it is possible to conceive; to the south-west you look up the valley of the Oprang river, which is bounded on either side by ranges of magnificent snowy mountains, rising abruptly from either bank, and far away in the distance could be seen the end of an immense glacier flowing down from the main range of the Mustagh Mountains. This scene was even more wild and bold than I had remembered it on my former journey, the mountains rising up tier upon tier in a succession of sharp needle-like peaks bewildering the eye by their number; and then in the background lie the great ice mountains—white, cold, and relentless, defying the hardiest traveller to enter their frozen clutches. I determined, however, to venture amongst them to examine the glaciers from which the Oprang river took its rise, and leaving my escort at the foot of the Aghil Pass, set out on an exploration in that direction.

The first march was easy enough, leading over the broad pebbly bed of the Oprang river. Up one of the gorges to the south we caught a

magnificent view of the great peak K 2,* 28,278 feet high, and we halted for the night at a spot from which a view both of K 2 and of the Gusherbrum peaks, four of which are over 26,000 feet, was visible. On the following day our difficulties really began. The first was the great glacier which we had seen from the Aghil Pass; it protruded right across the valley of the Oprang river, nearly touching the cliffs on the right bank; but fortunately the river had kept a way for itself by continually washing away the end of the glacier, which terminated in a great wall of ice 150 to 200 feet high. This glacier runs down from the Gusherbrum, which is seen in the distance towering up to a height of over 26,000 feet. The passage round the end of the glacier was not unattended with danger, for the stream was swift and strong, and on my pony I had to reconnoitre very carefully for points where it was shallow enough to cross, while there was also some fear of fragments from the great ice-wall falling down on the top of us when we were passing along close under it.

After getting round this obstacle we entered a gravel plain, some three-quarters of a mile broad, and were then encountered by another glacier running across the valley of the Oprang river. This appeared to me to be one of the principal sources of the river, and I determined to ascend it. Another glacier could be seen to the south, and yet a third coming in a south-east direction and rising apparently not very far from the Karakoram Pass. We were therefore now in an ice-bound region, with glaciers in front of us, glaciers behind us, and glaciers all around us. Heavy snow-clouds too were unfortunately collecting to increase our difficulties, and I felt that we should have a hard task before us. On first looking at one of these glaciers it would appear impossible to take ponies up them, but the sides are always covered with moraine, and my experience in the exploration of the Mustagh Pass in 1887 showed that by carefully reconnoitring ahead, it was generally possible to take the ponies for a considerable distance at least up such glaciers. As the one we had now reached seemed no worse than others, and there appeared a gap in the range which looked as if it might be a pass, I took my ponies on, and after three days' scrambling on the ice, reached the foot of the supposed pass, and started at 3.30 on the following morning to find if it was at all practicable. It was snowing hard and freezing hard, while dense clouds overhead hid the moon, so that we had barely sufficient light by which to find our way. On the previous afternoon I had reconnoitred ahead, determined the general line of advance, and the best point at which to attack the pass; so we now proceeded steadily up the névé at the head of the glacier. At first crevasses were frequent, some visible—great staring rents in the ice fifty or sixty feet deep; others invisible, being covered with snow. These last were the dangerous ones, for the snow would suddenly

* Mount Godwin Austen.

give way under you, and a deep dark hole would be disclosed at your feet. But though this frequently happened we had no accidents, and the higher we reached the less frequent became the crevasses, though the snow was softer, and trudging along, sinking knee-deep at every step, was heavy work.

Day now began to dawn, but the heavy snowstorm did not cease, and we could only see the lower parts of the mountains, while their summits were hidden in the clouds. We were making towards a ravine, which we had made out could be the only possible way to the top of the pass, and were rounding an icy slope forming one side of it, when suddenly we heard a report like thunder, and then a rushing sound. We knew at once that it was an avalanche; it was coming from straight above us, and I felt in that moment greater fear than I ever yet have done, for we could see nothing, but only heard this tremendous rushing sound coming down upon us. One of the men called out to run, but we could not do so, for we were on an ice-slope, up which we were hewing our way with an axe. The sound came nearer and nearer; then a cloud of snow-dust, and the avalanche rushed past us in the ravine by our side. Had this happened a quarter of an hour earlier, we should have been in the ravine and buried by the avalanche. We now continued the ascent of the ice-slope, hoping we might find a road by that way, but we were brought up by a great rent in the ice, a yawning chasm of considerable width with perpendicular walls of solid ice. This effectually put an end to our attempt to cross the pass, for I dared not descend into the ravine through fear of avalanches.

We therefore were obliged to return and give up all hopes of reaching the top; the highest point we reached being just over 17,000 feet. On our way back we saw another avalanche rush down the mountain side, and over the very path we had made in ascending, covering up our actual footsteps in the snow. Seeing how dangerous it was to remain where we were, we hastened on, and very thankful I was when we again reached the open glacier, out of reach of avalanches. Snow continued to fall heavily, and we heard the reports of avalanches on the mountains all around us. My men said that if the sky were to clear, and we could wait a week for the snow to settle, we might find a way over the pass. But in any case it would be a piece of difficult mountaineering, and as, moreover, I could not afford to wait a week in a place where neither fuel nor grass could be obtained, and where everything was buried in snow and ice, I decided upon returning to my camp on the Oprang river, giving up any further attempt at crossing the pass. We accordingly hastened back to our camp at the head of the glacier; the snow continued to fall, and our little camp in the middle of the glacier looked very cheerless in the morning. Ponies, tents, baggage, and everything were covered with snow when we struck camp, and continued our march down the glacier.

We were able to make a double march, as we had the track marked out, and the bad places improved by our march up. That evening we encamped on dry ground, where we could get grass for the ponies, a certain amount of fuel, and smooth sand to lie upon at night, instead of the thin layer of sharp stones which separated us from two or three hundred feet of solid ice on the glacier. The length of this glacier is 18 miles, and its average breadth half a mile; it is fed by three smaller glaciers on the west and one on the east. At its upper part, immediately under the pass, it is a smooth undulating snow-field about a mile and a half in width. Lower down this *névé* is split up into crevasses, which increase in size the further down we get. Then the surface gradually breaks up into a mass of ice-domes, which lower down become sharp needle-like pinnacles of pure white ice. On each side lateral gravel moraines appear, and other glaciers join, each with its centre of white ice-peaks and its lateral moraines, preserving each its own distinct course down the valley, until some three miles from its termination in the Oprang river, when the ice peaks are all melted down and the glacier presents the appearance of a billowy mass of moraine. It would look like a vast collection of gravel heaps, were it not that you see, here and there, a cave or a cliff of ice, showing that the gravel forms really only a very thin coating on the surface, and that beneath is all pure solid ice. This ice is of opaque white, and not so green and transparent as other glaciers I have seen. The snow at the head of the glacier was different to any I had seen before; for beneath the surface, or when it was formed into lumps, it was of the most lovely pale transparent blue. I must mention, too, that every flake of snow that fell in the storm was a perfect hexagonal star, most beautiful and delicate in form. The mountains on either side of the valley, especially on the eastern side, are extremely rugged and precipitous, affording little or no resting place for the snow, which drains off immediately into the glacier below. The western range, the main Mustagh Range, was enveloped in clouds nearly the whole time, and I only occasionally caught a glimpse of some peak of stupendous height, one of them, the Gusherbrum, over 26,000 feet, and others 24,000 feet. The snowfall on these mountains must be very considerable. It seems that this knot of lofty mountains attracts the great mass of the snow-clouds, and gets the share which ought to fall on the Karakoram. The latter being lower, attracts the clouds to a less degree, and is in consequence almost bare of snow.

I now hurried back to my escort at the foot of the Aghil Pass, and after rejoining them we set out on September 21st down the valley of the Oprang river, and up the tributary flowing from the Mustagh Pass to Suget Jangal. From here a large glacier could be seen flowing down from the westward, and at the end of it a gap in the main range which I thought might be the Shimahal Pass. I therefore left the heavy baggage under the charge of one Gurkha and a Balti coolie, and

set out for the exploration of the glacier with twelve ponies carrying supplies and fuel for twelve days for my party and escort. On September 23rd we left Suget Jangal, and by midday were again on a glacier, and our experiences there may be better told by making extracts from my diary.

On September 24th we had rather a rough march up the glacier. The way to attack these glaciers is evidently first to keep along the side, on the lateral moraine, close to the mountain. Here there is some very fine going, though also, at times, some nasty pieces, where great, rough, sharp boulders are heaped one on another, like at the mouth of a quarry. Presently the glacier closes in on the mountain side, and you have then to take a favourable opportunity for plunging into the centre of the glacier, and ascending the part of it which is best covered with gravel moraine. Some very careful steering is here necessary to keep clear of the crevasses, and the ponies, and men too, often have a hard time of it, trying to keep their legs in ascending slopes where the gravel barely covers the ice. We took our plunge into the middle of this glacier at midday. Snow was falling, and at 4.35 the clouds became so heavy, and it was altogether so threatening, that I thought it best to halt. Of course, no grass or fuel are obtainable, but we brought two pony loads of wood with us, so were quite happy; though this is not a particularly cheerful looking spot, with the snow falling hard, the great white pinnacles of the glaciers rising all round, the mountains hidden by the heavy snow-clouds, and no place but a very stony hollow to encamp in. The Gurkha havildar had a joke about getting hold of some *narm pattar* (soft stones) to sleep on, which kept him and all the Gurkhas in roars of laughter.

The next morning we set out in a heavy snowstorm, so heavy that even the bases of the mountains on each side of the glacier were at times not visible, and the summits were not seen till midday, and even then only in glimpses. Immediately on leaving camp we were confronted by a series of very bad crevasses running across our path. Things looked hopeless at one time, for it was like finding a way through a maze. The naik and I went on ahead, and by going from one end of each crevasse to the other we managed in every case to find a way across, though to advance a hundred yards we would have to go at least six times that distance. Once we completely lost our front in the maze and the snowstorm, and were wandering up a side glacier, till I recognised we were in the wrong direction by a hill-side appearing through the mist. We finally got clear of the bad crevasses, and then had a fairly clear run for a couple of miles; we were beginning to congratulate ourselves that we had got over the worst of the glacier, when we came upon another series of crevasses of the most desperate description. The ice, in fact, was so split up that, though the whole party explored in all directions, we could find no possible way of getting the ponies along.

I therefore decided upon encamping, and going on the next day with a few men lightly loaded to the pass. I had some tiffin—rather an important point upon those occasions when the time of the real tussle has arrived, and you are feeling rather down with things in general—and then started off to explore a route for the men to follow on the morrow; but although I went in and out everywhere along the whole front, I found it impossible to go ahead. I then returned to camp, set out again backwards to see if we had missed any practicable route, but it was useless. We were in a regular “cul de sac”; ahead were impassable crevasses, and on each side were the main lines of the glacier-peaks of pure ice, still more impracticable than the crevasses.

One does not feel much inclined to admire scenery when its very grandeur has been the cause of bringing you to a standstill, but the glacier here was really very magnificent. A vast sea of ice comes sweeping down from the Mustagh Range to the south, and makes a great bend; it was this bend which stopped us, for it has cracked the ice—just in the same way as the skin is cracked at the bend of the knuckle—and great crevasses have been formed, some so deep that the bottom is invisible. But the finest sights of all are the ice peaks broken into every fantastic shape, with great fringes of drooping icicles hanging from their sides, and ice-caverns, the entrances to which were closed by lines of long beautiful icicles.

On September 26th we started back down the glacier, snow still falling heavily. The Gurkha naik, Shahzad Mir, and myself kept looking everywhere for some way of getting off the glacier on to the mountain side, where it was evident we should find a passable road. Once or twice we got right up to the edge of the glacier, but a few crevasses and broken crags of ice always prevented us from actually reaching *terra firma*. I was on the point of giving up when I saw what seemed to be a practicable route. The others stayed behind, saying it was impossible, but I went on and on, and at last reached the edge of the glacier; only a pond heaped up with blocks of ice and frozen over, separated me from the mountain side. The ice was very treacherous, but by feeling about with my alpen-stock I got across safely, and then going along the side of the mountain for some distance, found a very promising route, which I followed up for some little distance.

The sky had now cleared, and I had a glorious view of the Mustagh Mountains such as I shall never forget. Their appearance, indeed, was truly magnificent as they rose up in solemn grandeur for thousands of feet above me, sublime and solitary in their glory, their sides covered with the accumulated snow of countless ages, and their valleys filled with glistening glaciers. With infinite toil and difficulty I had insinuated my way through the chinks in their seemingly impregnable armour of rock and ice, and my feelings now as I looked on the wonderful scene before me can only be appreciated by one who has himself penetrated the great

mountain solitudes of the Himalayas, and stood alone, as I was then, deep in the inmost recesses of the mightiest range of mountains in the world; separated from the haunts of civilisation by chain after chain of inhospitable mountains, and far from the abodes of even the wild and hardy hill-men of the Himalayas. Alone, where no white men have ever yet set foot, where all was snow and ice, pure, white, and unblemished, and where not even the rustle of a single leaf, the faintest murmur of a stream, or the hum of the smallest insect, rose to break the spell of calm repose which reigned around. I seemed, indeed, to be intruding on the abode of some great, invisible, but all pervading Deity—the Emblem of Eternal Rest; to have risen from the world beneath to higher land, where the trials and troubles of humanity were unknown; where all was wrapt in that stern repose of the mountains—a quiet, calm and deep, and made impressive by the feeling that beneath its placid surface, great and mighty forces were slowly and silently, yet constantly at work. Amid surroundings of such sublimity, the overpowering presence of the mountains, and the profound and solemn silence, produced in me impressions which I shall never forget.

On returning to the lake, I found the naik and Shahzad Mir had followed me, the former having got across all right, but Shahzad had gone through the ice up to his waist. The water was far out of his depth, and he had only saved himself by clinging to a large block of ice close by. On again crossing the lake I also went through twice, but as I thought the ice would be stronger by the next day, I hurried after the rest of the party, whom I had ordered to stop at a certain point. I then brought back my own kit, some supplies, grain for the ponies, and a pony load of wood, to a spot as near to the lake as the ponies could go, while the Gurkhas went back to Guget Jangal. My intention was to try and reach the pass with three men carrying loads. I at first meant to go without a tent, but as it was still snowing hard, and a bitter wind blowing, while at night the thermometer was down to 6° , and at the head of the glacier would probably be below zero, I decided upon taking the small servants' tent, which I used on this detached expedition. We carried the poles as alpen-stocks, leaving the pegs behind, as we could use stones instead, so that the whole weight of the tent was not more than twenty pounds; and we all four slept in it at night. The weather was anything but cheering, and the snow very trying, especially for the men who had to do the cooking in the open air. It was fortunate I brought only hill-men well accustomed to the work. The packs arrived covered thick with snow, and neither my men nor myself had a dry pair of boots; we could only afford a very small fire, which was not sufficient to dry a thing before the falling snow wetted it again. The floor of my tent was snow over a few inches of gravel, and then two or three hundred feet of ice. However, a good comfortable sheep-skin coat helped me to defy a lot of discomfort. Each of the men had

also a good sheepskin with which I had provided them at Shahidula, so we were pretty cheery despite the snow and cold.

On the following morning we started off towards the lake. This is fed from the melting of the glacier, but, as the sun had not appeared for the last few days, the water had diminished several feet, while the layer of ice remained at the top. This layer had now fallen through here and there, and though it was treacherous enough the day before, it was utterly impracticable now, especially for men with loads. I ventured a few yards on to the ice, but seeing it falling through all round me with sharp reports, I hurried back; and we had then to give up all hopes of reaching the pass. We returned to our late camping ground, loaded up the ponies, and started off back towards Suget Jangal. At the time I was much disappointed at not reaching what I supposed to be a pass, but I afterwards found it was no pass at all and did not cross the main, but merely a subsidiary range; even if I had crossed it, I should only have found myself on another glacier with another rango before me.

The glacier we did our best to surmount I called the *Crevasse Glacier*, on account of the great number and size of the crevasses, which were wider and deeper, and far more frequent than I have seen on any other glacier, and this I attribute to the bends. The widest branch comes from the south, and makes a bend almost at right angles at the furthest point which we reached; it is here joined by a longer but narrower branch from the pass. The length is about 24 miles, and the breadth from 1000 to 1200 yards. It ends at an elevation of about 13,000 feet opposite to a stream issuing from a small glacier running down from the second peak on the southern side. Its lower extremity, for more than two miles, is entirely covered with moraine, but higher up it presents the magnificent spectacle of a sea of pure white peaks of ice, with numerous similar glaciers of smaller size running down to it from the lofty snowy mountains on the southern side. On the north only one glacier of any size joins in, and it is evident that the southern rango gets by far the greater portion of the snowfall, although the mountains on the north are in some cases very little inferior in height. The *Crevasse Glacier* seemed to me to be retiring; at any rate, I should certainly say it was not advancing, for the moraine was deposited some few hundred yards in advance of the ice of the glacier, and there were marks of glacial action on the mountain sides far above the present level of the glacier. The small glaciers—those resembling clotted cream—on the mountain slopes were certainly retiring. The glacier was very much lower in the centre than at the sides, where there were remains of successive beds of conglomerate, compact and hard, and level at the top, of a different character altogether from glacial moraine, so that it appeared as if there had formerly been a thick bed of conglomerate filling up the valley, which had now been swept out by the glacier.

This, however, is only in the lower half, where the mountain slopes are comparatively gentle and formed of shingle; higher up, the sides are precipitous, and there are no signs of the conglomerate formation. The fall of the glacier as far as we went was 2280 feet in 24,400 yards, or about $\frac{1}{10}$. Its general direction is N.N.W.

On September 30th, after a good day's rest, we again made our way into the valley of the Oprang river, which I now intended to explore down to its junction with the Raskam or Yarkand river. This part was unknown even to the Kirghiz, and we could not be sure that the stream ever would join the Yarkand river, or where it would lead to, but had to take our chance of its coming out as we hoped it would. We found the river flowing on in a north-west direction over a pebbly bed, varying from one-half to one mile in width. The mountain slopes on each side were perfectly bare, and often precipitous, so that it was impossible to take our ponies along them; we had therefore to march along the valley bottom, which necessitated our frequently crossing and recrossing the river, for the stream would first dash up against the limestone cliffs on one side of the valley, and then be buffeted back to the opposite bank; therefore continually barring our progress. Even now, in the beginning of October, the water was well up the ponies' backs, the current strong, the bottom covered with boulders, and the passage therefore not unattended with risk. Patches of grass and low jungle are occasionally met with, but none of any extent. At three marches from Suget Jangal a stream from the Shimshal Pass, leading to Hunza, joins the Oprang river. It is by this way that the Kanjūtis usually raid on the Loh-Yarkand road, and I turned aside from my route to have a look at their robber stronghold, a place called Darwaza, on the northern side of the pass. Ascending the right bank of the stream, and passing by some old huts and fields which had evidently at one time been ploughed, we suddenly came in sight of a tower on the top of a cliff, and, as we came closer, saw that the whole line, where it was accessible, was covered by a loopholed wall, at the upper end of which was a second tower. The cliff was the bank of a deep ravine, which the road crossed, and then zigzagged up to the tower, where there was a wooden gate. This was the den of the Kanjūti robbers, who have for so many years raided on the countries round, and from which, on the previous year, they had attacked the Kirghiz and carried off twenty-one captives. I had no idea what sort of reception I should meet with in trying to penetrate the very inmost haunts of these mountain robbers, so I now proceeded cautiously.

I made the Gurkhas line the opposite bank of the ravine, while I went on ahead with my orderly and the interpreter. I thought that if I took my whole party on at once it might frighten the Kanjūtis if they wanted to be friendly, while if they wished to be hostile the Gurkhas were much better situated for covering my retreat on the

top of the cliff, than they would be with me trying to cross the ravine. While I was descending into the ravine, one of the little Gurkhas came running after me, begging to be allowed to come with me. Many weeks before the Kirghiz had been dilating on the dangers of going near these robbers, and had said that the first man who appeared at this fort would certainly be killed. Turning round to one of my Gurkhas, I had said in chaff, "All right, I will send you on first." A broad grin of satisfaction came over his face as he replied, "Yea, mind you do Sahib." And now it was this little man who came rushing after me, saying I had promised to let him go first, and begging me to fulfil my promise. I had descended one side of the ravine, crossed the frozen stream at the bottom, and was ascending the zigzag up to the tower: the door was open, and I thought we were going to have a peaceable entry, when suddenly there came loud shouts from above, the door was shut, and men appeared along the wall and on the tower, gesticulating wildly, and pointing their matchlocks at us. It was not a pleasant situation, as we were close under the wall, and the path to the gate led along parallel to it. I halted, and made signs, beckoning to them to send a man down to us, holding up one finger, and shouting "Bi adam, bi adam!" (the Turki for one man). The shouting on both sides continued for some time, but eventually the door opened, two men came down to us, and we had a long parley, which lasted for more than hour. Fortunately, Colonel Durand who had just visited Hunza from the Gilgit side, had been able to establish friendly relations with the Khan Saïder Ali, so that after making sure that I had not an army with me, the commander of the outpost let us through, and then we all collected round a huge bonfire—Kanjútis, Kirghiz, Gurkhas, Ladakis, a Balti, a Pathan, and one Englishman in the heart of these great mountains, where no European had ever before penetrated. These Kanjútis were the first men outside our party we had met for forty-one days, as all the country we had been exploring since leaving Shahidula is entirely uninhabited.

The mountains beyond the place in the direction of Hunza were of stupendous height, and very bold and sharp in their outline. An immense glacier could be seen, from which the stream we were on took its rise, and I had no time to explore it, as I wished to follow out the Oprang river, and afterwards get on to the Tagh-dum-bash Pamir. We therefore returned to this task, and I was fully expecting to meet the Yarkand river almost immediately, but just as I had arrived at the point where I had quite counted on doing so, the Oprang took a turn round in the reverse direction. The volume of the river was increasing at every mile, the mountain sides continued precipitous, and I thought it possible that even if the Oprang joined the Yarkand river, we might be prevented by the depth of the water from following it down. No such misfortune awaited us, however, and on the third day after leaving the Shimshal

Pass stream, while on ahead of the rest of my party, I came across a river of some size, though not so large as the Oprang. It did not strike me that it could be the Yarkand river, because it was so very much smaller than that river had been when we last left it higher up, and the colour of the water was a clear blue, whereas we had left the Yarkand river a muddy brown. But when the Kirghiz came up they at once recognised the spot: they assured me that the river was none other than the Yarkand, reminding me that a month had passed since we had last seen it; with the approach of winter the melting of the snows ceases and the river diminishes rapidly, and losing the muddy deposits, becomes clear and blue.

The Oprang river, which we had thus followed to its junction with what is locally known as the Raskam river, but which we usually mark on our maps as the Yarkand river, might almost be called the main branch of the river which flows by Yarkand. It is true that the more northerly branch is some 30 miles longer; the Raskam river to its junction with the Oprang being about 180 miles in length, while the Oprang is only about 150. But the latter has quite twice the volume of water of the former, on account of its receiving the drainage of the vast glaciers in the vicinity of the Mustagh Pass. Between the Oprang and the Raskam rivers is the range of mountains which is crossed by the Aghil Pass. It runs in a general north-west direction, parallel to and intermediate between the Mustagh Range and the western Kuen-lun Mountains. It is about 120 miles in length and is broken up into a series of bold upstanding peaks, the highest of which must be close on 23,000 feet. Near its junction with the Mustagh Mountains there are some large glaciers like those which fill the valleys leading down from the main watershed, but towards its western extremity these vast *mers de glace* are not seen, and only the smaller kind of glaciers are found on the higher slopes. The mountain sides are perfectly bare, and only the scantiest scrub is found in the valley bottoms. At the junction of the Oprang river with the Raskam is a large stretch of jungle known as Chong Jangal (the great jungle), and both here and further down I saw old huts, signs of cultivated fields, an old smelting furnace, and other indications that the country had been formerly inhabited. In fact, even in recent years the Kirghiz from the Tagh-dum-bash Pamir have cultivated little plots of land up some secluded side valley where they think they may be free from observation, and in one of these, called the Uruk (apricot) Valley, there are still some apricot trees bearing fruit.

At Chong Jangal we were joined by Kirghiz bearing the second instalment of supplies, and exchanging our worn-out ponies for some camels brought down to us from the Tagh-dum-bash Pamir we started off for that more elevated valley. It was on the first march after leaving the Raskam river that I met the Russian traveller, Colonel

(then Captain) Grombochevsky, who was on his way from the Pamirs to explore the country north of the Mustagh Mountains and Tibet. He and his companion, M. Conrad, a German naturalist, invited me to dinner on my arrival in their camp, and I spent two very pleasant days with them. It was now two months since I had met a European, and the fact that we were both military officers and both explorers was an additional reason for our fraternising together, and I bear a very agreeable recollection of that first meeting with the Russians in the wilds of Central Asia. At parting I made my Gurkha escort present arms as a salute to the Russian explorer, and Colonel Grombochevsky ordered his escort of seven Cossacks to draw swords in return.

I then left for the Tagh-dum-dash Pamir, and crossing an easy pass 14,600 feet high, named the Kurba or Ili-su, found myself free of the high cliffs and lofty mountains which shut in the valleys of the Yarkand river and its tributaries; instead I saw before me broad open valleys, very fairly covered with grass, bounded indeed by rugged snowy mountains, but not closed in by them to the same extent as the valleys we had left had been. This was my first sight of the Pamirs. A bitter cold wind greeted us as we descended from the pass, scarcely leaving us for an hour during the whole three weeks we were on the Tagh-dum-bash Pamir, and though the thermometer never fell more than five degrees below zero Fahrenheit, the cold seemed to be just double the intensity of that we had experienced in the valley of the Yarkand river where, at a height of 8800 feet above sea-level, and in the middle of October, the thermometer had fallen to zero, but in a calm atmosphere without wind. Wind, indeed, makes a vast deal of difference, for while it seems to lower very considerably the temperature of one's body it has the effect of raising the mercury of a thermometer. On one occasion especially I remember noticing this. Snow had been falling heavily all day, and a bitter wind had been blowing, but just before sunset both the wind and the snow ceased and a very peculiar phenomenon occurred. The whole air became glistening with particles which I at first thought must be the sun shining on minute atoms of snow; but on holding out the sleeve of my coat nothing seemed to settle on it, and the Kirghiz informed me that this phenomenon often occurred after a snowstorm, and was the presage of great cold to follow. The thermometer soon after fell to five degrees below zero Fahrenheit, but the wind sprang up again and the thermometer immediately rose to zero and did not fall below it again during the whole night.

Leaving my escort at the upper part of the Tagh-dum-bash Pamir I now pushed on rapidly to Tash-kurgan to meet Major Cumberland and Lieutenant Bower, who had started from Leh just before me, and had explored the outlying northern spurs of the Western Kuen-lun Mountains, from Kilian to Sarikol; they had met the Russian expedition under Colonel Pievtsof on the way. After reaching Sarikol they

had wandered up the Tagh-dum-bash Pamir to shoot *Ovis Poli*, and had been successful in bagging eleven of these magnificent wild sheep. They had here parted company with that adventurous French traveller M. Dauvergne, who had accompanied them from Leh, and who afterwards returned to India across the Baroghil Pass, and down the Karambar valley to Gilgit, making some very interesting observations on the way. I could only spare one day with Cumberland and Bower, for winter was rapidly approaching, and I feared we might be prevented by snow from crossing the passes into Hunza. I accordingly rapidly retraced my steps up the Tagh-dum-bash Pamir, while they went off to Yarkand. Tash-kurgan was visited by Colonel Gordon and some members of the Forsyth Mission in 1874, and more recently by the Russian travellers Grombehevsky and Grum-Grijmailo, and I can add nothing to the accounts which these have given of the place and its interesting inhabitants, who cannot be far removed from the original stock of the Aryan race. The Tagh-dum-bash Pamir, however, is less well known, and a description of it is necessary. The name signifies, the supreme head of the mountains. It is divided at the upper extremity into two branches, one coming down from the Wakhjirni Pass, the other from the Khunjerab Pass. Its greatest length is 35 miles, and the breadth varies from one mile at its upper portion to four or five miles at its lower end; its height above sea-level, commencing at 10,800 feet, rises to 15,500 feet. It is inhabited both by Kirghiz and Sarikolis, and a few fugitive Wakhis may be found inhabiting secluded side valleys in the lower part, where they make attempts to cultivate the ground in spite of their having frequently to reap their crops before they have ripened. Near the junction of the two branches of the Pamir is the old fort of Kurgan i-Ujadbai, and a mile or two below is another ancient fort built high up on a rock on the left bank. Both these are now unoccupied and the inhabitants of the Tagh-dum-bash Pamir live in tents only. Rejoining my escort I proceeded by the Mintaka Pass into Hunza. Snow had fallen heavily on it, as we were now in November, but the yaks of the Kirghis carried our baggage over without difficulty. The height I calculated to be 14,400 feet, and in summer it is quite free from snow. There are heavy boulders on the summit, and the route passes for a mile and a half over a glacier on the southern side, but with the mountains rising to such a stupendous height all round, one feels thankful to find so comparatively easy a pass to cross the range by.

We were now in Hunza territory, and were met by a deputation from the Chief Saifur Ali Khan, offering us every assistance. On the following day, after passing through some narrow defiles where one looked up at cliffs rising, to all appearances perpendicular, thousands of feet till they ended in snow-capped mountain peaks, we reached the first village Misgab. This, like all the villages in Hunza, is walled, and is in fact a

fort. The walls of these fort-villages are always made of stone; they are from 10 to 15 feet in thickness, and layers of wood are placed at intervals up them to strengthen them and keep them together. The inhabitants are a hard determined-looking lot, with a firmer character than the people round. But, withal, I should not call them a really warlike race, such for instance as the Pathan tribes on our frontier. The raids for which they are so famous are usually got up by their chiefs; the people are driven to them, and, curiously enough, shared very little in the spoils. The Kanjútis, however, may certainly be called bold, and they possess a large amount of what I cannot express better than by the slang word "cheek." Shut up in their secluded valley, and constantly successful in raids on their weaker neighbours, they have never realised that any one more powerful than themselves exists, and the cool effrontery with which they have demanded blackmail, not only from the Kirghiz of the neighbouring Pamirs, but also from the distant valleys, almost up to Kugiar, is something very remarkable.

The road down the Hunza valley had been previously traversed by Colonel Lockhart's mission, as well as by Colonel Grombchevsky. Throughout the scenery is very striking, and Major Barrow has calculated that there are more peaks over 20,000 feet in this state than there are over 10,000 feet in the whole of the Alps, while a few reach even to 25,000 feet; as to the road, Colonel Grombchevsky has said that even he, an experienced hunter in the Turkistan mountains, had to be helped along in parts. But with our heads turned once again towards India, and with the air growing denser at every step down the valley, and putting new life into one after breathing the rarefied atmosphere of the higher regions for so long, we thought little of the difficulties of the road. After passing through a succession of small villages with cultivated grounds on the long fan-shaped deposits of alluvium which run out from the side gorges, and after crossing the end of yet one more glacier, which terminates at the height of only 8000 feet above sea-level, just above the village of Paru, we reached Gulmit, where the chief Safder Ali Khan was waiting to receive me. I was welcomed by the roar of cannon, which a deputation sent out to meet me informed me was intended as a salute, and at which, therefore, I must not be afraid. I was then conducted between two long rows of rough, wild-looking men with matchlocks and swords to a tent in which Safder Ali Khan received me. This interesting person had a few years ago murdered his father, poisoned his mother, and thrown his two brothers over precipices, and then announced his deeds to his suzerain the Maharaja of Kashmir in the following terms: "By the grace of God and the decree of fate my father and I fell out. I took the initiative and settled the matter, and have placed myself on the throne of my ancestors." I was surprised to find him a fair-complexioned man with

reddish hair and a type of features very European in appearance. He was not unintelligent, but very conceited, and rather childish and impracticable. On my asking him whether he had ever been to India he said that great kings like himself and Alexander never left their own country. According to the last accounts from India, however, he has recently left his country rather rapidly, though not in the direction of India.

Time does not permit me to describe at length my interesting visit to Hunza. After staying a week with Safder Ali I pushed on to Gilgit, where I found Col. Durand, the newly-appointed British Agent, just establishing himself. I reached Kashmir in the middle of December, and then parted with my gallant little Gurkha escort. As I was saying good-bye to them they told me that before leaving their regiment the head native officer had had them up, and told them that if anything happened to me on this journey not one of them was to return alive to disgrace their regiment. I can well believe that they would have stuck to me through anything and everything, and I feel assured that if a British officer has a few of the 5th, or indeed any other Gurkha regiment, at his back, he will never find himself in want of support when the time for action comes.

The summer of 1890 again found me wending my way northward through Kashmir. On this occasion I was unaccompanied by any escort, as I should be travelling through a country where the personal influence and prestige of a British officer was of as much protection as many soldiers. But I was fortunate enough to have a companion, Mr. Macartney, a proficient Chinese scholar, who not only proved an agreeable companion but was very useful in interpreting with the officials of the country. Passing rapidly through Kashmir, Macartney and I reached Leh towards the end of July, and here we were joined by two sportsmen, Messrs. Beech and Lennard, who having shot over nearly the whole of India, were in search of fresh fields for conquest in Chinese Turkistan and the Pamirs. Again I have to thank Captain Ramsay, the Joint Commissioner at Leh, for all the assistance he so willingly gave. On August 2nd my companions and I left Leh to follow that same dreary route across the Karakoram Pass to Yarkand, which place we reached on August 31st. We had heard, on arriving in Chinese Turkistan, that Col. Grombohevsky was in the vicinity on his return from Tibet, and a few days afterwards he also arrived in Yarkand.

After a rest of two or three weeks at that place Macartney and I left our companions and started for a trip round the Pamirs. Approaching this interesting region from the plains of Kashgaria, one sees clearly how it has acquired the name of *Bam-i-dunya*, or *Roof of the World*. The Pamir Mountains rise apparently quite suddenly out of the plain from a height of 4000 feet above sea-level at their base to over 25,000 feet at their loftiest summits—a massive wall of rocks, snow, and ice.

Mounting this wall the traveller comes on to the Bam-i-dunya, which would perhaps be better translated as the "upper storey" of the world. Houses in Turkistan are flat-roofed, and you ascend the outer wall and sit out on the roof which thus makes an upper storey, and it appears to me that it was in this sense that the Pamir region was called the Roof of the World. The name, indeed, seems singularly appropriate, for once through the gorges which lead up from the plains, one enters a region of broad open valleys separated by comparatively low ranges of mountains. These valleys are known as Pamirs—Pamir being the term applied by the natives of those parts to a particular kind of valley. In the Hindu Kush and Himalayan region the valleys as a rule are deep, narrow, and shut in. But on the Roof of the World they seem to have been choked up with the debris falling from the mountains on either side, which appeared to me to be older than those further south, and to have been longer exposed to the wearing process, in many parts, indeed, being rounded off into mere mounds, reminding one very much of Tennyson's lines—

"The hills are shadows, and they flow
From form to form, and nothing stands;
They melt like mist; the solid lands,
Like clouds they shape themselves and go."

The valleys have thus been filled up faster than the rainfall has been able to wash them out, and so their bottoms are sometimes as much as four or five miles broad, almost level, and of considerable height above the sea. The Tagh-dum-bash Pamir runs as low as 10,300 feet, but on the other hand, at its upper extremity the height is over 15,000 feet, and the other Pamirs vary from twelve or thirteen to fourteen thousand feet above sea-level. That is, the bottoms of these Pamir valleys are level with the higher summits of the Alps.

As might be expected, the climate is very severe. I have only been there in the autumn, and can therefore speak from personal experience of that season only; but I visited them on three successive years and have seen ice in the basin of my tent in August; I have seen the thermometer at zero (Fahrenheit) at the end of September, and 18° below (that is 50° of frost) at the end of October. The snow on the valley bottoms does not clear away before May is well advanced. June and July and the beginning of August are said to be pleasant, though with chilly nights, and then, what we in England might very justly call winter, but which, not to hurt the feelings of the hardy Kirghiz who inhabit these inhospitable regions all the year round, we will, for courtesy's sake call autumn, commences. Cultivation in such a climate is naturally impossible, and the Kirghiz are dependant for the few supplies they consider necessary upon the lower parts of the valley which lead down from the Pamirs on either side—on the one hand to Sarikol, and on the other to Shighnan. Grass, however, is plentiful in

certain localities, and where it is met with is of excellent quality and affords very fine pasturage to the flocks and herds of the Kirghiz. But it covers quite a small proportion of the valleys only, and the mountain sides are practically barren, the coarsest scrub being the only kind of vegetation met with on them. Trees are never seen on the Pamirs proper, and I do not recollect having come across even a bush of any size. The inhabitants are therefore dependent for fuel upon roots or dry dung. These inhabitants—the Kirghiz—are a nomadic pastoral people, living in the round felt tents which are here called *akooes*, and which in the Turkoman country are called *kibitkas*. Their principal food is milk, curds, and cheese; occasionally they kill a sheep for mutton, but bread of any description is eaten only as a luxury. They are hardy, not very intelligent, inclined to be independent in their ways, though not very warlike; given occasionally to robbery when they think they can do so with impunity; hospitable, and by no means so exclusive and frightened of strangers as the inhabitants of the shut-in valleys of the Hindu Kush and the Himalayas.

I cannot refrain from remarking here on the influence of the natural surroundings upon the character of the people of a country. It has been my fortune to travel in very varied descriptions of country—in the dense gloomy forests of Manchuria; over the bounding grassy steppes of Mongolia; across the desolate wastes of the Desert of Gobi; and among the mountain valleys of the Himalayas and Hindu Kush. Each different type of country produced its own peculiar impression upon me, and has enabled me to appreciate perhaps more keenly than I otherwise should have done its particular influence upon the inhabitants. The forest produces a feeling of indescribable depression—one seems so hedged in and hampered about, and longs to be free of the endless succession of trunks of trees and be able to see clear space in front. Far preferable, in my opinion, is the desolation of the desert, which, depressing as it may be, in some way produces also a feeling of freedom; and on the open steppes an irresistible desire to roam and wander seems to come over one, which I can well understand was the motive power which caused the Mongol hordes under Chinghis Khan to overrun the rest of Asia, and part even of Europe. Again, with these Mongols of the desert and the steppes a stranger is always hospitably received, and there is little of that dread of people from the outside, so frequently met with among barbarous nations. The Kirghiz of the open Pamirs, too, have something of these characteristics. But directly one enters narrow shut-in valleys such as are found on the southern slopes of the Hindu Kush and the Himalayas, one finds the ideas of the people shut in too. They have a dread of strangers, they desire above all things to be left to themselves, and unless forced by over-population to do so, or led away by the ambitions of a chief, seldom leave the particular valley to which they belong.

But while I have been making this digression Mr. Macartney has been delayed at the foot of the hills waiting for me to come with him on to the Pamirs. Together we advanced up those long gravel desert slopes which lead out of the plains of Turkistan, and then through the lower outer ranges of hills covered with a thick deposit of mud and clay, which I believe to be nothing else than the dust of the desert, that is ever present in the well-known haze of Turkistan, deposited on the mountain sides; then over the Kizil-dawan, Kara-dawan, and Torat Passes, through the narrow defile known as the Tangitar. Here one has to force the ponies up a deep violent stream rushing over huge boulders between precipitous rocky cliffs, in which we noticed large square holes pierced, suggesting to us that in former days this, the high road between Eastern and Western Asia, was probably improved by having a bridge over this difficult and dangerous part; then over the Chichiklik and Kok-mamak Passes, and the Tagharma Plain till we reached the neighbourhood of Tash-kurgan, the northernmost point of my explorations in the previous year.

A few days' halt was now necessary to lay in supplies of flour for the men, and grain for the ponies, and then on October 3rd we left for the Little Pamir, by way of the Neza-tash Pass. On the third day, descending on the western side, we saw before us a plain, about four miles wide, bounded on the north by comparatively low rounded mountains, whose summits were not covered with snow. This valley was the Little Pamir, and near the debouchment from the pass is the rock called Ak-tash, in the vicinity of which were five or six Kirghiz tents and the headquarters of a local beg. The Little Pamir is generally spoken of as ending here, though why, it is hard to say, for the valley of the Ak-su river continues wide and open as before, right down to, and for a few miles below, the junction of the Ak-baital river. We did not follow it down, however, but struck across the round gravel hills to the north, into the valley of the Istigh river, forming the eastern extremity of the Great Pamir, and from there we moved towards the Alichur. I now observed that the mountains which in the eastern portion of the Pamirs are low and much worn down, commencing a little east of Lake Victoria, became considerably higher and more bold and rugged in their outline. It was near the foot of these more lofty mountains, to the north of Lake Victoria, at a place called Ak-chak-tash, that we found a hot spring of some size, the temperature of which exceeded 140° Fahrenheit, the highest point to which our thermometer registered.

We struck the Alichur Pamir near Chadir-tash at its eastern extremity, and from there looked down a broad level valley, averaging four or five miles in width, to some high snowy peaks overhanging Lake Yashil-kul at its western extremity. The range bounding this Pamir on the north is free of snow in summer, but that separating

it from the Great Pamir is of considerable height, the summits always covered with snow, and the passes across it difficult. Traces of ancient glaciers are very frequent, and the western end near Lake Yashil-kul is choked up with their moraines, forming a sea of gravel mounds, in the hollows of which numerous lesser lakes may be seen. On the borders of Yashil-kul, at a place called Somatash, we found the fragments of a stone bearing an ancient inscription in Turki, Chinese, and Manchu. This interesting relic, as far as I have been able to get the rubbings I took of it translated, refers to the expulsion of the two Khojas from Kashgar by the Chinese in 1759, and relates how they were pursued to the Badakhshan frontier.

We found very few inhabitants on the Alichur Pamir, perhaps because, except near Somatash, there is little good grass to be found. But on returning up the Pamir and descending into the valley of the Ak-su we found twenty or thirty Kirghiz tents pitched, the climate very much milder (though even there the thermometer fell to zero at night), and good grass by the river banks. The Ak-su was here 40 or 50 yards wide, and deep as a rule, but fordable in places. From here we ascended the sterile valley of the Ak-baital, which at this season of the year (October) has no water in it, and visited Lake Rang-kul. On the edge of this lake is a prominent outstanding rock, in which there is a cave with what appears to be a perpetual light burning in it. This rock is called by the natives *Chiragh-tash*, i. e., the Lamp Rock, and they account for the light by saying that it comes from the eye of a dragon which lives in the cave. This interesting rock naturally excited my curiosity. From below I could see the light quite distinctly, and it seemed to come from some phosphorescent substance. I asked the Kirghiz if any one had ever entered the cave, and they replied that no one would dare to risk the anger of the dragon. My Afghan orderly, however, had as little belief in dragons as I had, and we set off to scale the cliff together. By dint of taking off our boots and scrambling up the rocks, very much like cats, we managed to reach the mouth of the cave, and on gaining an entrance found that the light came neither from the eye of a dragon nor from any phosphorescent substance, but from the usual source of light—the sun. The cave in fact extended to the other side of the rock, thus forming a hole right through it. From below, however, one cannot see this, but only the roof of the cavern, which, being covered with a lime deposit, reflects a peculiar description of light. Whether the superstitious Kirghiz will believe this or not I cannot say, but I think the probability is that they will prefer to trust to the old traditions of their forefathers rather than the wild story of a hare-brained stranger.

The water of Rang-kul is salt, and the colour is a beautiful clear blue. The mountains in the vicinity are low, rounded and uninteresting, though from the eastern end a fine view of the great snowy Tagharma

peak may be obtained. Before leaving these parts I was anxious to see the largest of the numerous lakes which stud this elevated region. I accordingly made a flying visit to the Great Karakul, and was well repaid for my trouble, for I have seldom witnessed a scene more impressive in its wildness than that which here met the eye. A violent storm was raging, the whole lake was lashed into a mass of foam, and heavy snow-clouds were sent scudding along the frowning mountain sides, but above all rose the great snowy peak, Mount Kaufmann, calm and serene amid the warring elements raging at its base. This lake has at present no outlet, and is now at a lower level than it formerly has been, for I noticed distinct signs on the mountain sides of its having, at one time, risen higher up. I left the vicinity of the lake by the Kara-art Pass, and travelling down the Markhan-su, and then over the outlying spurs of the lofty snow-clad range which forms the eastern parapet of the Pamirs, reached Kashgar at the end of October. Here we went into winter quarters, and though the months we spent seemed somewhat long and dreary, at times we had a little society to enliven us. First there was the Russian Consul and his wife, M. and Madame Petrovsky, who, with the secretary, M. Lutsch, have been established at Kashgar for some eight or nine years. M. Petrovsky takes the keenest interest in all scientific subjects; he has there a very valuable library, and a fine collection of instruments of all kinds, and it is sincerely to be hoped that he may one day publish to the world the careful investigations he has made in many branches of scientific enquiry. Another resident in Kashgar is the Dutch missionary, Père Hendriks, a man of diverse accomplishments, who interested us much by his accounts of travels in many lands in the past, and schemes of missionary enterprise for the future. We were fortunate also to have several visitors from the outside—from M. 'E. Blanc, a French gentleman who had been travelling round Russian Turkestan; from M. Sven Hedin, a Swedish geologist, who only paid a flying visit, but who intended to return and explore Lob Nor; and, lastly, from M. Dutreuil de Rhins and his companion, M. Grenard, who were setting out on a very interesting journey in Northern Tibet. M. de Rhins was indefatigable in making astronomical observations at Kashgar, and the result of his scientific mission ought to prove of much value, while his companion is likely to give us very graphic descriptions of the country they pass through. Another visitor to Kashgar was Mr. Jones, who recently read an interesting paper before the Society of Arts, but I was unfortunately absent from Kashgar at the time of his visit. Our old companions Beech and Lennard returned from their shooting trip in time for us all to spend Christmas together, and in February Beech made a trip to Tashkend, where he was very hospitably entertained by the Russian Governor-General. On his return he and his companion started off to shoot on the Pamirs, and succeeded in bagging seventeen *Ovis Poli* between them.

It was not till the end of last July that I left Kashgar. Just before leaving I was joined by an adventurous young subaltern, Lieut. Davison, who, having obtained a few months' leave from the regiment, was seized with an irresistible ardour to explore the Mustagh Pass, although he had previously seen nothing higher than Primrose Hill. However, a British subaltern is not easily frightened off when "on business he's intent." Davison did not succeed in crossing the Mustagh Pass, for in the months of May and June, when he attempted it, the melting of the snow makes it quite impossible to get anywhere near it. But he did succeed in crossing the Karakoram Pass, marching the whole way from Kashmir on foot, and getting his baggage ponies over the pass by throwing down felt for them to cross the soft snow on. He further marched along the valley of the Yarkand river to the Khoja Mohammed gorge, and it was only after making an unsuccessful attempt to swim the river there with a rope round his waist, after three of his ponies had died on the passes, and after two of his men had deserted with most of the supplies, reducing him almost to starvation, that he gave in and made his way to me at Kashgar.

Before leaving Kashgar the hospitable Chinese officials, who had shown us much friendly attention during our stay, entertained us at a round of dinners, and we finally left on July 22nd to return to India by way of the Pamirs and Gilgit. The most direct route to the Pamirs lay up the Gez defile, but there was still much water in the torrent which flows through it, and we were compelled to cross a succession of low but difficult passes leading over the spurs running down to the right bank of the river. Emerging from the defile we came upon a fine grassy plain, perhaps ten miles wide in places, and to the left saw a large lake. This was not marked on any map I had, and I was further puzzled to see quantities of sand-drifts covering the lower parts of the low rounded mountains on the opposite bank. As the water of the lake there came right up to the mountain side, it was difficult to see where the sand could come from; but I found that the lake was only a few feet deep, and when the melting of the snows has finished, it dwindles down to a mere marsh, exposing also large deposits of sand, which the wind blows on to the mountain sides.

At Lake Bulun-kul, the next march westwards, Davison parted with me for a time, travelling towards the Alichur Pamir, while I made my way to Tash-kurgan. On reaching the Little Kara-kul Lake, a piece of interesting geography, which I believe had been first noticed by Mr. Ney Elias, on his journey through these parts some years ago, presented itself. Captain Trotter, of the Forsyth mission, saw from the plains of Kashgar a stupendous peak, the height of which he found to be 25,300 feet, and the position of which he determined accurately. From Tash-kurgan or its neighbourhood he also saw a high mountain mass in the direction of the peak he had fixed from near Kashgar; had

weather prevented his determining the position of this second peak, but he thought there was no doubt that the two were identical. Such, however, is not the case. There are two peaks, about 20 miles apart, one on either side of the Little Kara-kul Lake. That seen from Tash-kurgan is the true Tagharma Peak, and cannot be seen from Kashgar; while that seen from Kashgar cannot be seen from Tash-kurgan. There appeared to me to be very little difference in height between the two. Both are remarkable not only for their extraordinary height, but also for their great massiveness. They are not mere peaks, but great masses of mountain, looking from the lake as if they were bulged out from the neighbouring plain, and one sees far more distinctly than is usually the case, the layers upon layers of rock which have been upturned like the leaves of a book forced upwards. It struck me too, especially from the appearance of the rocks in the neighbourhood of the northernmost peak, that these must have been upheaved far more recently than the worn-out-looking mountains in the centre of the region of the Pamirs. The appearance of these two great mountain masses rising in stately grandeur on either side of a beautiful lake of clear blue water is, as may be well imagined, a truly magnificent spectacle, and high as they are, their rise is so gradual and even, that one feels sorely tempted to ascend their maiden summits and view the scene from the loftiest parapets of the "Roof of the World." Leisure to do this was, however, not available, and I marched down to Tash-kurgan, then retraced my former footsteps up the Tagh-dum-bash Pamir, and crossing the easy Wakhijsrui Pass, first explored by Colonel Lockhart's mission, travelled down the Pamir-i-Wakhan to its junction with the Little Pamir at Bozai-Gumbaz. The Pamir-i-Wakhan was uninhabited at the time of my visit, but during the winter it is frequented by Wakhis on account of its right bank facing south and consequently receiving the largest amount of sunshine. There are no houses at Bozai-Gumbaz, but a small mud dome marks the spot where a Kirghiz chief named Bozai was murdered; the only inhabitants at the time of my visit were a Pathan and a Wakhi family living up a side valley to pasture their flocks and herds.

I found, however, ten Russian soldiers encamped at this place, and Colonel Yenoff with twenty more arrived a few days later. Our first meeting was of a friendly character, and after the Russian Colonel and his staff had had tea and wine in my tent they asked me to dinner in their camp and we spent a very jovial evening together. I was as much struck by the simplicity of their camp arrangements as, from lately published accounts, they, and Colonel Grombchevsky also, seem to have been by the luxury of mine. They had tents only big enough to sit up in, while mine was large enough to stand upright in; they had to sit and lie on the ground, while I had a chair and a bed to rest myself on; and finally I had the crowning luxury of a table. Such was

the difference of style between the pampered British officer and the Spartan-like Russian. I do not know if I ought to be ashamed of all this luxury, and I can only say that I go on the principle of making myself as comfortable as circumstances will permit, and the conditions of travel on the Pamirs are not so hard but what the little luxuries I have named above may be carried with one. When necessity to do so arises, I, like every other British officer, can rough it on very little, and I have no wish to boast when I say that I do not believe that even Russian explorers have gone through more hardships than I had to undergo when, in 1887, I crossed the entire breadth of the Himalayas from Yarkand to Kashmir, without a tent, sleeping in the open air, even on the glaciers of the Mustagh. My good friend Colonel Yonoff, I am sure, never grudged my simple luxuries, but I make these remarks in case there may be misguided British officers who think that in order to explore they must make themselves as uncomfortable as possible. If such there be, let me give my opinion that more roughing than is absolutely necessary should always be avoided on principle. It not only makes one less fit physically when the time for real action arrives, but also, if continued for month after month, on long explorations, degrades the mind and makes one forget that he belongs to a civilised portion of the human race. It gradually obscures the brightness of the intellect, which, if one wishes to enjoy travel in any way, to appreciate the new scenes and effects of nature which one meets with, and to observe truly, must necessarily be kept as keen and clear as possible.

After a short stay at Bozai-Gumbaz I returned to the Tagh-dum-bash Pamir to the very valley, opposite the Kilik Pass, where Beech and Lennard had in the spring shot so many specimens of *Ovis Poli*. Perhaps those that were left had become wilder; at any rate, though I saw several herds of them, I only succeeded in hitting one of these splendid animals. Here I encamped for six weeks at an elevation of 15,000 feet; throughout September snowstorms were constant, and the thermometer gradually fell lower and lower, till it just reached zero. My companion Davison rejoined me on October 4th, and we left together the following day to explore an interesting little corner of Central Asia, the point where the two watersheds—the one between the Indus on the south and the Oxus and Eastern Turkistan rivers on the north, and the other between the Oxus on the west and the Eastern Turkistan rivers on the east—join. If any point can be called the Heart of Central Asia, I should think this must be it. Here on the Oxus side of the watershed are vast snowfields and glaciers, and among these, with three of its sides formed of cliffs of ice—the terminal walls of glaciers—we found a small lake, about three-quarters of a mile in width, out of which flowed the stream which joins the Panj branch of the Oxus at Bozai-Gumbaz.

On October 13th we reached Gilgit in safety, and after being most

hospitably entertained there by Col. Durand and the officers of the British Agency, pressed on rapidly to Kashmir. Heavy snow had fallen on the passes, but we crossed them without mishap, and from the summit of the last, the well-known Tragbal Pass, looked down once more upon the smiling fields, the calm, peaceful lake, and the beautifully wooded mountain sides of the lovely vale of Kashmir. Descending rapidly through the pine forests, and discarding our heavy fur coats as the climate grew milder and milder, we reached the shores of the lake in the evening, threw ourselves into a luxurious Kashmir gondola, and were paddled smoothly and quickly over the still lake towards Srinagar. All dangers, difficulties, and anxieties were now over, and after an absence of seventeen months I was returning once more to the pleasures of civilisation and intercourse with my countrymen and friends; and seldom indeed do there occur in one's lifetime moments more to be looked back to than that quiet sunset hour on the tranquil lake when one could rest, and rest, and rest, and feel that all the dark was left behind, and hope that all before was bright.

The PRESIDENT in introducing Captain Younghusband to the Society said this was hardly necessary, as most of them would remember that two years ago they had the pleasure to give him one of the gold medals on account of a very valuable and adventurous journey he made from Manchuria and Peking right across to the Mustagh Pass, and so to India. Only a fortnight ago he was good enough to come to the Society and make some interesting observations with respect to the paper which had been read by Mr. Campbell, he having approached the mountain, the principal object of Mr. Campbell's journey, from the other side, and having had the good fortune Mr. Campbell did not have, of reaching its summit. On this occasion he was going to give an account of two journeys he made from India through the very core of Central Asia.

The following discussion ensued after the reading of the paper:—

SIR RICHARD TEMPLE: I think I should be only speaking your sentiments if I convey to the reader of the paper our cordial and hearty appreciation, not only of the interesting narrative he has given us, but of the literary skill and cultured phraseology in which he has couched his observations. I am sure in this hall you often have heard papers marked by great beauty of diction, but I am sure you have seldom heard a more beautifully worded paper than that to which we have just listened. But not only is the paper given with all this charm of literary manner, there is also the manly simplicity and vigour of sentiment that are peculiarly British. This is not the first time perhaps that the mysteries of the Pamir have been explored, for the last generation witnessed the remarkable journeys of Wood, whose name is imperishably connected with this elevated plateau; but Wood and his companions approached it from another direction, i.e. from the direction of Afghanistan. Captain Younghusband and his little party entered it from the south-east; they gradually approached the extreme elevation of the plateau, the most elevated of its kind in the world, by the valley of the Oxus, and so reached the source of that memorable river. But these explorations of which you have heard the account of to-night, are remarkable from the fact that they enter the Pamir from the lower plateau of Yarkand, and I presume that the mountain peaks of which we have just heard a description almost as brilliant as the peaks themselves, are great *horas* of ice and glacier which separate this plateau from the

lower one of Yarkand. That great wall of mountains stretching upon the eastern side of the map, which separates off the plateau of the Pamirs from that of Yarkand, is, I believe, the mighty barrier to which our lecturer has alluded this evening. Further, you will notice on the map hung on the wall the point where this great range impinges upon the Himalaya. It is from about that corner that I trust the British Imperial jurisdiction is considered to extend. I trust you will all keep your thoughts steadily fixed upon that, and remember the broad geographical description given of it this evening. I hope other speakers will supplement the expression of thankfulness I have ventured to present to you. I hope also that our lecturer has found in this country that repose which he has already found in Kashmir. I am myself well acquainted with that lily of the valley, that rose of geographical scenery, Kashmir, and can readily understand how, after that journey, he looked upon the range on range extending to the north, and thought of all the mighty associations and the magnificent scenery that lay behind.

Mr. HOWORTH: The only justification I have for addressing you is that, like my friend Sir Richard Temple, I have tried to qualify the dubious reputation of a politician by writing some books, very different to his, however, as mine are unreadable. In these I have tried to discuss the history, ethnography, and geology of portions of this district. I cannot begin without supplementing my excellent friend's remarks in regard to the modesty and literary excellence which have conveyed to us the story of the pluck and energy of this English soldier who has disclosed to us the hidden secrets of the Pamir. I might remind you that in the beginning of the sixteenth century, when Baber was writing those delightful memoirs of his, a cousin of his, a prince of Kashgar, wrote another series, full of admirable detail, in which he describes, in the most graphic way, the troubles he had in campaigning in this very country. He describes the roads, lakes, and rivers, with great detail, and his story would interest you were it made available. It is a curious thing that the race occupying these hills, and which gives the topography its Turkish character, namely, the Kirghiz, were not there until they were driven down from the far north by the Kalmucks in the early sixteenth century. The accounts, some of which I have published, of the wars and struggles of Chinghiz Khan's descendants, one of whom reigned in Kashgar and one in Bokhara, contain very interesting details of the topography of this country. But if we go back beyond the Mongol dynasty, we must go back a long way indeed before we get any reliable details at all. It may be that the Hunzas are descended in some distant way from the Huns described by Kosmas Indicopleustes in the seventh century as having an enormous realm stretching right away to the Indus, but we have really very little information about it. At the earliest possible point we can reach, we find this region right away to the Caspian occupied by tribes of the Persian family, nomads, who under different names occupied the whole southern borders of the great Central Asiatic steppes, and if we stretch the historical telescope still further we shall find that the old story which made the Pamir the original home of the Aryan race called Indo-European no longer holds good. We can no longer trace it from here, but we have every reason to believe that it came from the west, from the country round the Caspian, for we now know that from Mesopotamia, right away to the borders of China, there was in very early times a continuous occupation of the country by those yellow slant-eyed races which we sometimes call Turanians and sometimes Mongolians. One word upon a great geological problem. Nearly all this Central Asiatic plateau is really a huge elevated saucer surrounded by high hills, the Tien Shan on the north, the Pamir on the west, the Himalaya on the south. North of this is the great plain of Siberia. All over this plain we find, wherever the ground is sufficiently hard frozen, the remains of mammoths, &c., preserved very fresh, so that the wolves and bears can feed upon their remains.

These great mammoths have been found, not in one, but in many places all over the country, from the east, right to the Obi. They are found under conditions which make it certain that they could not have lived unless the surroundings and climate were entirely different. We have the remains of the plants on which they fed, and southern contemporary shells all found with the remains, pointing to climatic conditions which do not exist any longer. Now what was it produced a change in these conditions? I believe myself that this vast plateau is one of the most recent features in the physical geography of the world, and that its rapid elevation caused the tremendous change of climate which has enabled the bodies of these great beasts to be preserved intact as we find them. Unless these animals had been frozen immediately they died, and remained frozen to this day, they would certainly have decayed and disappeared; a single Siberian summer sun would have destroyed them completely, and consequently we have a huge problem to face in which I am much interested, and which I have discussed at some length in my book on 'The Mammoth and the Flood.' It would be a great addition to our knowledge if a traveller were to bring back some of the evidences we need as to the exact age of the deposits on the crest of the plateau. We know that further east the bones of great animals have been found 17,000 feet above the level of the sea, under conditions which Falconer declared to be absolutely incompatible with their mode of life. Being a heretic, I am most incorrigible, but I will not be burned for any view I hold. Short of being burned, I am prepared to fight for my opinion in favour of the recent origin of the Pamir. I cannot conclude without expressing my warm personal thanks to the reader of the paper, although I cannot do so in the graceful way my friend Sir Richard Temple has done.

MR. D. FRESHFIELD: Both as a mountaineer and as one of the Secretaries of this Society, I should like to add a few words of thanks to the author of the paper just read. Captain Younghusband has introduced us to the north side of the great glacier range that extends from the Karakorum Pass up to the Tazh-dum-bash Pamir, and the easy and strategically important passes that connect that region with Hunza and Gilgit, of which he has verified the existence and ascertained the heights. On the northern flanks of the Karakorum he has visited many hitherto unmapped glaciers. In exploring these without having gone through any Alpine apprenticeship in mountain-craft he had a difficult task, and in one sense he was heavily handicapped. To cross a glacier pass is often not easy; to force ponies across one is always difficult. One general remark of Captain Younghusband's, a remark previously made by another great traveller, Mr. Johnston, I should like to endorse. It is very important that young travellers should be disabused of the notion that there is any merit in incurring needless hardships. I would say to them: "Be ready to rough it when called on; but don't, particularly on rough journeys, rough it more than you need." The more a man takes out of himself physically, the less for the moment is left in him mentally. One last word. We have kept off our hand-map, you may notice, all political boundaries. But you must on no account consider that the political boundaries laid down on other maps recently issued, which display an extensive so-called neutral zone, are correct. This zone is not to be found in any treaty or document of which we have any knowledge.

THE PRESIDENT: Your feelings have been so well and so vividly expressed by three speakers, Sir Richard Temple who has treated more especially the literary side of Captain Younghusband's performance, Mr. Howarth who has had to say a good deal about his ideas on geology, and Mr. Freshfield who has spoken as a mountaineer, that I do not think it is necessary for me to do more than formally to express your thanks to Captain Younghusband.

Captain YOUNGHUSBAND acknowledged the vote of thanks.

GEOGRAPHICAL NOTES.

The Geographical Studentship at Oxford.—The first award of the Geographical Studentship given jointly by the Society and the University has just been made. The Examiners appointed were the Hon. G. C. Brodrick, Warden of Merton, Mr. F. Galton, Mr. E. Armstrong, Mr. D. W. Freshfield, and Mr. Mackinder. The Studentship is of the value of 100*l.*, and the student is required to undertake the geographical investigation, physical or historical, of one out of a list of regions drawn up by the Reader in Geography and approved by the electors; to reside at least three months in the region he is investigating; and to forward the results of his work to the Royal Geographical Society. Four qualified gentlemen presented themselves, and the successful competitor was Mr. G. Brindoe Grundy, of Brasenose College. He proposes, with the assent of the Council and the University, to select Bœotia as his field of research.

The New Librarian.—At the last meeting of the Council, Mr. Hugh Robert Mill, D.Sc., was appointed to fill the vacant post of Librarian. Dr. Mill has done some good original work in geographical research, has had considerable experience as a lecturer, and is the author of several text-books, including a General Text-book of Geography, a Primer of Commercial Geography, and 'The Realm of Nature,' a text-book of physiography.

Geographical Prizes to the Training Colleges.—The Royal Geographical Society's prizes for proficiency in Geography in the late examination of students in training colleges have been awarded by the Government examiners as follows:—Male students, F. G. Abney (Durham), A. Battersby (Westminster), F. H. Flint and H. Foster (Borough Road), J. H. Watson (Carnarvon). As these are all bracketed equal, the Council, at the suggestion of the Education Department, have decided to divide the value of the scholarship (15*l.*) and the prizes equally among the five. Female students (scholarship 15*l.*), Violet Mary Webb (Stockwell). Prizes (books), Margaret Routledge (Southlands), Mary Baxter (Stockwell), Lydia Rawlins (Whitelands), Florence Aldhouse and Mary Hay (Southlands). In subsequent years, instead of one scholarship of 15*l.* to each of the two students holding the first places, there will be three prizes of 5*l.* each to the first three in each group, the book prizes remaining as they are at present.

Geographical Societies.—From Herr Wichmann's report on the Geographical Societies of the world which appears in the 'Geographisches Jahrbuch,' edited by Professor Hermann Wagner and Dr. Supan, we gather the following facts. Since the publication of the last report (in 1888), twelve new Societies have come into existence. Of these we may

mention the Tyneside Geographical Society with over 1000 members; the Norwegian Geographical Society at Christiania, which has shown great activity in connection with Dr. Nansen's forthcoming expedition; at Moscow, Professor Annuchine has started a geographical section of the *Société Impériale des Amis des Sciences Naturelles*, and at Vienna, Professor Penck has revived the Society of Geographical Students at that University. Finland rejoices in the possession of two separate societies at Helsingfors, with an aggregate membership of 161. Though the number of societies has increased by twelve and now amounts to 113, the number of members has only increased by 2300, making an aggregate of 52,800. France heads the list with thirty-one societies and 18,650 members; next comes Germany with twenty-three societies and 8960 members; the British Empire with ten societies and 7600 members, of which latter our own Society claims no less than 3580. Russia follows with eight societies, Switzerland beats Italy, the Austrian Empire, and the United States, and takes fifth place with six societies and 1788 members.

The Old Channel of the Oxus.—The Uzboi or old channel of the Oxus, supposed by some to have united this river with the Caspian,† is the subject of a very interesting lecture delivered in January of this year before the Tiflis branch of the Imperial Russian Geographical Society. The lecturer M. A. M. Konshine had passed five years (1881-6) in the Aralo-Caspian plains, and had in the course of his travels crossed the Uzboi in various places, from its so-called 'delta' in the Dardji peninsula to the present river. His conclusions are that the Oxus never at any period flowed along this channel, and that its final discharge was in the lakes of Sary-Kamysh. He relies mainly on the geological facts brought to light by the investigations made by him with Prince Gedroits in the basin of Sary-Kamysh, and on the levellings run across this depression in all directions by the topographers. These data afford ample evidence that Sary-Kamysh was within recent geological times a vast river delta with an area of about 20,000 square versts, separated from the Caspian basin by a ridge of higher land, while during exceptional floods some discharge probably took place by the Uzboi towards the Caspian. This theory is proved by the type of fossils and the geological strata. In the case of the molluscs, those found in Sary-Kamysh are generally similar to existing forms in the Aral sea, whereas in the lower Uzboi the nearer we approach the Caspian the less frequent are the lacustrine and riverine molluscs, their place being taken by organisms almost identical with those found in the Caspian Sea at the present day. As further evidence he gives the results of borings made in the peninsula of Dardji, at Mulla-Kari, Uzun-ada and other places. Though a depth of 60 feet has been reached there are no traces of freshwater deposits, of ligneous or peaty matter, river shells, &c., characteristic of the Sary-Kamysh beds; on the contrary, the Caspian borings have penetrated nothing but saline clays of a reddish colour and sands containing marine shells. The following is M. Konshine's theory of the genesis of the Uzboi: (1) The part next to the Caspian, and even as far as Igdy, may probably have been a gulf of this sea, the steep banks of the Uzboi marking the deep water channel; no Oxus river delta ever existed here. (2) The Upper Uzboi from Igdy to Bala-Ishen, near

* By Mr. E. Delmar Morgan.

† See 'Proc. R.G.S.' 1881, p. 286, and 1885, p. 234.

the Ust-Urt, received the temporary overflow of the brackish lacustrine waters of the Aralo-Sary-Kamysh depression. Let it be remarked here that the water-parting between the Caspian and lakes Sary-Kamysh is on the same level as that between this water-spread and the Aral, so that at flood times their waters commingled and flowed down the Uzboi. (3) The vast water-spread of Sary-Kamysh, from very early times separated from the Caspian, prevented the Amu Daria from reaching this sea, the ancient channels of the Oxus, frequently mentioned by Arab historians, were therefore situate in the eastern part of the Sary-Kamysh basin. M. Koushine finally discusses the question as to whether the Sary-Kamysh lakes served as a reservoir to the Amu Daria, much in the same way as the Lake of Geneva does for the Rhone, and the Bodensee for the Rhine, and answers in the negative, his reason being that the Uzboi could not have contained more than one-tenth of the volume of water brought down by the Amu Daria. He also denies that the Upper Uzboi formed one of those channels famous within the historical period as the seat of a large population and cultivation, for the ruins which he personally examined are of minor importance, not to be compared with the great remains so plentifully scattered over the Caucasus and Turkistan. The Arab descriptions were in fact true, always applying to them the following correction: when they spoke of the Caspian they meant lakes Sary-Kamysh, and their Oxus channels were those to the east of Sary-Kamysh connecting its basin with the modern river.

The Progress of Topographical Work in the Russian Empire.—Colonel J. C. Dalton, R.A., of the Intelligence Department of the War Office, sends some useful notes on this subject. At the joint session of the sections of Mathematical and Physical Geography of the Imperial Russian Geographical Society, held on Friday the 27th November, 1891, Major-General Kovarski of the General Staff made a statement as to the maps made by him, and now published, of the Geodetical, Astronomical and Topographical work carried out up to the year 1890 inclusive, on the vast territory of the Russian Empire. General Kovarski preceded his remarks on these maps before the above-named Society by two statements which included the following points:—(1) As to the organisation of a "Topographical Section" in the Department of the Minister of War. (2) On the measures taken by the above-named Department for the gradual development of topographical work suitable to the extent of the Empire, without increasing the regulated establishment of the Corps of Military Topographers. (3) The necessity of the utmost possible harmony of action between the six Ministries interested in the surveys of the earth's surface within the limits of the Russian Imperial Geographical Society. (4) The historical progress of the topographical work of the officers of the General Staff and of the members of the Corps of Military Topographers. (5) The results attained by them in Topographical work. More detailed notices of these reports were given in the *Russki Invalid* in November 1889 and 1890. General Kovarski then gave a summary of the work done in the Ministry of War, and of other topographical work on the Map of European Russia, on the scale of 1:8,400,000, and on the Map of Asiatic Russia, 1:12,000,000. After generally describing the value of exploring (from a physico-geographical point of view) completely unknown localities, before tracing out the courses of railway lines, the lecturer passed on to discuss the topographical material which is placed at the disposal of the War Ministry in the district between Strietensk and Khabarovka, where up to now no surveys have been made by the Engineers of "Ways and Communications." From Strietensk to Albazin and 400 versts (265 miles) further east, there are surveys of some kind of the valleys of the rivers Ur and Zeija, of the lower reaches of the rivers Bureya and Amur, of the immediate neighbourhood of Blagoveschensk, Skobelstin, Pompeevka, Mikhaïlo-Semenovski, and for the two or three settlements

far inland on the left bank of the river Zeya. After which quite close up to Khabarovka on both sides of that part of the aforesaid road, 560 *vorsts* (371 miles) in length, which extends far away to the north from the river Amur, the following are quite arbitrarily shown on the Russian maps, viz.:— the mass of rivers and streams which fall into the Amur on the left bank, the enormous mountain range of Turan, the rivers Burya, Tirna, Purin Sutor, Gajal, the Bureya Mountains, &c., &c. Passing over many subsequent interesting items of information, which are detailed in the 'Explanatory Memoranda' for General Kovarski's maps, which have already been issued by the Russian Imperial Geographical Society, we give below a list of the topographical work which up to the present date has not been taken in hand, viz.:— (1) That part of Finland bounded on the north and east by the White Sea, on the south-west by the northern shores of Lakes Onega and Ladoga, and on the west by the meridian of St. Petersburg. The country nearest to this, the rayon of Toksoy, was surveyed in the eighteenth century by Swedish engineers. This survey reminds us of the plan of St. Petersburg in the reign of Anna Ivanovna, A.D. 1730–1740. (2) The north-east of the Province of Archangel and the east part of that of Perm, adjacent to the chain of the Ural Mountains. (3) More than fourteen-fifteenths of Siberia, which comprises that territory lying east of the Ural Mountains up to the North Pacific Ocean, which belongs to the Russian Empire.

M. Dutreuil de Rhins in Central Asia.—According to the latest news (28th Nov. 1891) M. de Rhins and his companion M. Grenard had returned to Khotan after making an important excursion to Nis, in the course of which he had visited the principal source of the Koria-daria. Part of the route taken is new. The party suffered greatly from the cold and fatigue, and lost a large proportion of their horses and asses.

Commercial Geography of Japan.—At the meeting of the Geographical Society of Berlin of February 6th, Dr. K. Rathgen spoke upon the commercial and economical condition of Japan. He dwelt upon the influence which the orographical features of the country exercised upon the cultivation of the soil, the distribution of the population, and on the commercial routes. The coasts of Japan are more deficient in good harbours, especially for larger vessels, than is generally supposed. This is particularly the case in the north. The whole west and north-west coasts are as good as harbourless. The cost of land transport is very high. Dr. Rathgen gave some interesting facts with regard to the commerce by sea, and as to the railways of the country. The improved facilities for commerce have led to great displacements of the population. This is shown by the fact that the two large cities of Yokohama, with 120,000 inhabitants, and Kobe with 140,000, were thirty years ago mere fishing villages. Centralisation is the characteristic feature of modern Japan.

The Surface Configuration of Uganda and Unyoro.—Captain Lugard in his last report gives a useful description of the general appearance of Uganda as contrasted with Unyoro. Writing of the country to the west of Uganda he says the physical character of this country of Singo is very marked. It is one interminable series of rounded hills, many shaped like tumuli covered with pasture grass of fair quality, but much of it spear-grass. The hills are of red marl and shaly gravel, with

much of the iron-ore slag. The valleys are generally of black marsh soil, and full of coarse elephant-grass. The hills are usually some 300 feet above the valleys, and their elevation is about 4200 feet. The most singular feature of Uganda is the absence of any running water. Even in April, in the daily deluge of rain, there is no marked watershed. The valleys are merely damp, or even swampy, but in almost every instance can be crossed dry-shod. The rivers are large papyrus swamps, with no perceptible current and little water. Such watershed as there is is northwards, towards the Kafur and the Nile. Through the eastern part of Singo timber is scarce, the date-palm being almost the only tree. Towards Unyoro the borassus palm also grows in great quantities, and there is much tree growth, but little good timber. The whole of this country of Singo appears deserted, except in isolated districts held by the Mukwenda. The overgrown shambas and plantain groves supplied a certain amount of semi-wild produce for food. The water in Singo is very strongly impregnated with iron; the soil is often very rich and the grass good. All this country would probably do admirably for the culture of wheat and other cereals. Passing then from the inhabited country of the Mugoma, where, as a rule, the soil and grass are both good, we come to the undulating and hilly tracts of Eastern Singo, where timber and trees of any sort are still rare, and the soil poor on the hills, but rich in the valleys. A country of a different type is Western Singo, being very close and wooded with borassus, acacia, and euphorbia, and other trees, indicating a poor and rocky soil. Here the iron-ore slag is replaced by granite and sandstone, and the pasture and soil were of an inferior quality. Close to the borders of Unyoro is a large plain, which extends for a vast distance on our right. This is of the richest soil, and about 3900 feet elevation only. All Uganda in past times seems to have been intersected with broad roads, hood clear of grass, and often with culverts over the streams and swamps. These roads, though now fallen into disuse and overgrown, still show the marks of former industry, and it need not be difficult to make a good road, and keep it in repair, from Lake Victoria to the border of Uganda in the direction of Lake Albert, since the people are thoroughly accustomed to the work. In Singo Captain Lugard discovered a small lake some seven miles by five (Lake Isolt), and also ascertained that the Mwerungo river is merely a tributary of the Mwanja, which latter flows to the Kafur. The country of western Singo is full of elephants. The character of part of Unyoro is very distinctly marked from that of Uganda, though there are no marked physical boundaries. Whereas the endless hills of Uganda are rounded knolls, grass-clad, with little surface rock of iron-ore slag, those of Unyoro are of a much more rugged type. They are all of granite, and in most cases the top of each hill is of bare rock, often in peaks and crags, and boulders of fantastic shapes. These rocks are full of caves—known only to the Wanyoro—often of large size and capable of sheltering cattle and men. The soil both on the hills and in the valleys is remarkably rich, trees fairly plentiful, and great quantities of crops are raised in spite of the fact that Unyoro, like Uganda, relied for its food largely on its cattle till these all died. Bananas are not so ubiquitous as in Uganda, and much more grain is cultivated. Several kinds of sweet potatoes, cassava, maize, coffee-corn, beans, wimbi, sensem, and dhal, form the majority of the crops. Of these, potatoes predominate, with several kinds of beans (kundr). Here again were streams of running water. This country Captain Lugard imagines to be healthy and second to none in natural resources and richness of soil.

Longitude of Fort Salisbury.—A telegram from Fort Salisbury, Mashonaland, states the longitude of that place, as ascertained by Mr. Duncan, the Company's Surveyor-General, to be $31^{\circ} 4'$ E., within a mile.

Fixed Points on the Niger.—The astronomical observations of Captain Monteil in the Niger basin have now been calculated with the following result.

	Latitude (North).			Longitude (West).		
	°	'	"	°	'	"
Sikasso	11	18	57	4	33	15
Kinman	11	51	30	4	32	35
Bogumso	12	41	13	4	9	25
Zangoberi	13	0	9	5	1	44
Sereuso	13	15	9	3	56	29
Zan	13	19	16	4	4	26
Kuoro	12	2	7			
Kumberi	12	27	45			

The result as regards the longitude of Sikasso would seem to be untrustworthy; its probable longitude is $6^{\circ} 14'$.

The Industrial Capabilities of Zanzibar Island.—It is some years since an official report on the situation and prospects of Zanzibar, from a commercial standpoint, was last made by our representative at the court of the Sultan. Mr. Portal's report, recently issued by the Foreign Office, is dated in November of last year—before Zanzibar was declared a free port—but it contains much useful information with reference to the shipping and trade of the island, although the only reliable figures that can be obtained are those relating to the twelve months immediately preceding the date of the report when the customs were under English management. For the statistics of exports and imports those specially interested may be referred to the report and the supplement issued in March; but there are passages in Mr. Portal's survey of the situation which have a wider and more general interest. The cloves grown in Zanzibar and Pemba amount, he says, to about four-fifths of the crop of the whole world; and their cultivation, until lately, was so remunerative that almost every available acre of ground has been devoted to cloves, and the islands are in the dangerous and critical situation of being dependent on one form of cultivation, and on the well-being of one class of plant. A few years ago the price of cloves ranged from 7 dollars to 10 dollars per *frasila* (a measure of 35 lbs.), and the export duty on them was 30 per cent. *ad valorem*. The price now does not exceed $2\frac{1}{2}$ dollars to $2\frac{3}{4}$ dollars per *frasila*, and the export duty has been reduced to 25 per cent. The market is overstocked with cloves, and the demand for them appears, Mr. Portal says, diminishing rather than increasing. At the present time there are many thousands of acres of fertile land lying fallow in Zanzibar Island, overgrown by all kinds of tropical grasses, creepers, and bushes, but bearing nothing remunerative except, perhaps, a few coconuts. "Arab domination" is a sufficient explanation in Mr. Portal's opinion of this sinful waste of land. Years ago the Arabs learnt that there were two remunerative trades, (1) slave and ivory hunting; (2) clove growing. But the Arabs cannot read the changing signs of the times. Slave

hunting is doomed, and with the cessation of the slave supply and the fall in the price of cloves, the clove plantations will soon cease to bring in more than a small profit, and Mr. Portal prophesies that in the next few years large quantities of land will pass from Arab into Indian and European hands. With a fertile soil, a tropical climate, and an annual rainfall of from 80 to 140 inches, there should be no difficulty in finding crops which would yield a profit. Pine-apples, aloes, coco-nuts, oranges, mango, manioc, and vanilla are some of the cultures which Mr. Portal thinks may be successfully undertaken in Zanzibar, and, under English influence, he sees no reason, apparently, why the developments of the island commercially and agriculturally should not proceed along healthy lines.

The Crampel Expedition.—Authentic news of the disasters which befel the ill-fated expedition of M. Paul Crampel have now been received in a report made by M. Ch. Nebout, the only European survivor. M. Nebout, writing from Brazzaville, relates how M. Crampel wrote to him from El Kouti, complaining bitterly of the conduct of the Arabs in refusing to provide him with means of transport, and urging M. Nebout to press forward to his assistance with all possible speed. The last postscript to this letter was dated March 26th (1891). M. Crampel's intention was to make his way towards the north to visit a chief, of whom Snoussi, the Arab chieftain, had frequently spoken to him. A fortnight later M. Crampel wrote, announcing that with five men he had set out for the purpose of visiting this chief in the north, of arranging for the purchase of transport animals from him and of opening up the route for the main body of the caravan. A short time after writing this letter he was sent for by Snoussi, to whom he went, accompanied by M. Said. They were both attacked by men armed with knives, and then despatched by the guns of the Arabs. Their clothes were torn from their bodies, which were dragged through the bush, and their bodies were finally abandoned by the murderers. M'Bouiti, one of M. Crampel's servants, was made a prisoner, as were the soldiers who formed the escort. Some days after M'Bouiti succeeded in escaping, and reached M'Poko, where he informed M. Biscarrat of the murder of his comrades. M. Biscarrat hid M'Bouiti in his own room, and resolved to await the arrival of M. Nebout: but, unfortunately, M'Bouiti was seen by the Mussulmans, and about eight o'clock on the morning of the 25th May, about twenty men suddenly attacked M. Biscarrat, who was struck in the side with a knife by a M'Gapou, the only one of his tribe who took any part in the attack on the expedition. The Mussulmans then riddled his body with bullets. In the meantime a larger party had surrounded and taken prisoners M. Biscarrat's escort of Senogalis, who were, however, treated with every consideration, the Arabs saying to them that they had no quarrel with black men, but wished only to kill all the white men. The news of these disasters was brought to M. Nebout, who was making his

way to M'Poko, by a Basa named Thomas, and after debating the matter with his eight Senegalis M. Nebout decided that to attempt an attack on the Arabs would be only to court further disaster, and accordingly gave orders for a retreat, and the remnant of the expedition arrived at Brazzaville on the 24th of July.

M. Douliot's Mission in Madagascar.—M. Douliot who is charged by the Minister of Public Instruction in France with a mission of exploration in western Madagascar, has made a short journey of about 125 miles from Nosy Maudroka, which lies at the mouth of the Morondava, to Fort Manja and thence on to the village of Vondrove on the river Mangoka. The country traversed was formerly almost quite unknown. The traveller states that watercourses are more numerous in this region than had been supposed; most of the streams, at any rate in the dry season, do not find their way to the sea; their waters being lost in the sand at a short distance from the coast. M. Douliot contemplates another excursion into the interior across new country.

An Ascent of Roraima.*—Roraima, which was first ascended in 1884 by Mr. Everard Im Thurn, was climbed in November of last year by Mr. E. Cromer and Mr. Seyler, two collectors of orchids, who were in British Guiana in pursuit of their occupation.† But they not only succeeded in getting to the top of the mountain: they spent a night there, and took several photographs of the scenery. They started with a number of Indians on the morning of the 28th of November, having spent some days at the foot of the mountain while the path was being cleared. The top was reached about one o'clock, and a spot selected for the camp. After gathering a quantity of a scarlet flowering *Utricularia*, which grows in great profusion on the top, the Indians felt the cold so severely—the temperature being 58° Fahr.—that they had to be sent back. The two white men then explored the top, finding towards the south many gigantic and marvellously shaped rocks, forming, as Mr. Cromer describes them, "majestic palaces, churches and fortresses." Other smaller rocks resembled pyramids, umbrellas, kettles, and one bore a striking likeness to the statue of a man. Between these grotesque masses of rocks were innumerable lochs, some joined together by canals, most of which were shallow, although here and there a depth of six feet was found. At 1 a.m. the temperature was 48° Fahr. In the morning many new species of orchids and other plants were found; but the mountain-top seemed almost destitute of animal life. Mr. Cromer noticed one black butterfly, a few spiders, some small frogs, some small lizards, and a small dark-coloured mammal, almost certainly, he thinks, a species of *Kibiho* (*Nasua fusca* ?), which, on his approach, gave a sound like a whistle, and swiftly crept into a hiding place between the rocks. The lakes on the

* 'Proc. R.G.S.' 1885, p. 497; also p. 522, for account of an ascent by Mr. Perkins.

† For a previous ascent by Mr. Cromer see 'Proc. R.G.S.' 1883, p. 166.

summit, which cover a considerable area (one Mr. Cromer measured was a hundred and fifty yards wide), were swarming with a sort of black-beetle. Mr. Cromer and his companion are the first men who have stayed a night on the top of Roraima.

Exploration in Western Australia.—Mr. Gillett has recently contributed to the Royal Geographical Society of Australasia, Sydney, a short paper on his exploration of that portion of Western Australia lying between the townships of Northam and Eucla. As at least 200 miles of the route was previously unknown, a few notes on the physical features of the country, &c., may be of interest. Mr. J. B. Browne and Mr. Gillett, having been placed in charge of the exploring expedition, which consisted of five men and fourteen horses, left the township of Northam, situated about 70 miles east of Perth, on 5th August, 1887, reaching Eucla, a distance of over 700 miles, on the 3rd October. The whole stretch of country passed through was of a slightly undulating character, and might almost be described as level. But few hills of importance were encountered. The country at the Hampton Plains consists of a series of open plains covered with salt-bush and grass, interspersed with belts of forest. After the limestone formation is reached (lat. $31^{\circ} 10' S.$, long. $124^{\circ} 30' E.$), the country which had hitherto consisted largely of open forest, opened out into grassy and salt-bush plains, which extended to Eucla, and, Mr. Gillett states, should be well adapted to pastoral purposes. There the party discovered many caves or holes which appeared to penetrate to a great depth into the earth, probably leading to some subterraneous streams. With the exception of an occasional sand plain, the land is stated to be excellent, showing frequently a rich red loam, which, in Mr. Gillett's opinion, is admirably adapted for cereals. No country whatever was seen that could be designated a desert. It is worthy of note that during the period between August 10th and the 3rd September, when the party reached 60 miles east of the Hampton Plains, rain fell more or less every day, and from the general appearance of the country at the time of Mr. Gillett's visit, this would not seem an exceptional occurrence. Springs were found at many places, and evidently water exists only a few feet from the surface. On entering the country east of Hampton Plains the expedition appears to have suffered much from want of water, but even here there were many indications of its existence. The region appears to be rich in minerals, much of the country travelled over being covered with quartz, and, as Mr. Gillett states, there was positive evidence of the existence of gold. There appears to be no scarcity of useful timber, especially of the eucalyptus species. The white gum was found to be very plentiful; there was also an abundance of what is called the "ginlet wood." The limestone country is largely covered with mallee. The natives encountered are described as of finer physique than the semi-civilised aborigines seen in the neighbourhood of large towns.

Vegetation of New Guinea.—At the meeting of the Berlin Geographical Society on February 6th, Dr. O. Warburg read a paper upon the conditions of vegetation in New Guinea. The author gave a short history of the progress of our knowledge of the flora of this, the largest island in the world, from the time when Lesson in 1827, on board the French corvette *Astrolabe*, brought home the first botanical collection, down to the most recent period, when the officials of the New Guinea Company and the expeditions of Sir W. Macgregor have collected such a wealth of material, that to-day there are as many of the higher plants of New Guinea known to science as there are of German plants, viz. about 2000. Inasmuch as the component parts of the forest change in extraordinarily short distances, it may be expected that at least three times as many species will in course of time become known. The island has furnished such an abundance of important and prominent new types that, as regards plant life, it may be regarded as one of the most interesting and beautiful parts of the earth. The close relationship often supposed to exist between the North Australian flora and that of New Guinea has not been confirmed. It is true that the savannas of the Fly River, covered with eucalyptus, myrtaceæ, and proteaceæ, correspond not only in their outward habitus, but also in composition with the formation of York Peninsula; but the typical Australian flora is quite foreign to New Guinea, and there is no ground for the supposition that the island was at one time inhabited by Australian species. The palm flora of the island is one of the richest in the world; almost every district is distinguished by endemic species. The age of the island must be very great; the large number of indigenous genera and species testify to this: of the former there are at least fifty already known.

Whaling Voyage to the Antarctic Seas.—An experimental voyage, which, though its main object is commercial, is not without interest of a more general kind, is about to be undertaken by Captain Gray of Peterhead, the well-known Arctic whaler. Captain Gray is of opinion that the value of the Antarctic Seas as a whaling ground has never been properly tested, and he has, we believe, succeeded in raising the capital necessary for prosecuting an experimental voyage with a couple of vessels of some 400 or 500 tons register, propelled by auxiliary engines of 70 or 80 horse-power nominal. A statement issued by Captain Gray and his brother contains numerous extracts from the literature on the Antarctic regions, as evidence that there is a reasonable prospect of developing a new and important industry in the Southern Seas. "We have," say the authors of the statement, "been induced to select that region in the Antarctic area lying between the meridian of Greenwich and 90° W. long. as the locality in which, in our opinion, the fishery we have projected might be prosecuted with the greatest advantage. It was explored by Captain Ross in his last voyage, and has been reported by him to be frequented by the right whale in great numbers. It is besides accessible from Britain by a direct route lying between the continents of America and Africa, not exceeding 7200 miles in length, or a two months' passage, at an average speed of five knots per hour. We think that the month of December, corresponding to that of June in the northern hemisphere, which has generally been chosen for the commencement of the



work of exploration in the Antarctic Seas, is too late, and that it might be prosecuted with advantage at least a month earlier. We should therefore recommend that, on the event of vessels being fitted out to prosecute the fishery in the South Polar Seas, they should leave the country in August, and reach the whaling ground by the end of October, which would give at least four months, viz. November, December, January, and February—ample time for completing their cargoes, and enable them to reach Britain again in May, thus leaving from three to four months for discharging and refitting before sailing on a new voyage in August.”—As Hiron Nordenskjöld's son is to accompany the expedition as naturalist, it is to be hoped that some gain to geography as well as to the whaling industry may result.

Obituary.

Henry Walter Bates, F.R.S.—In the March number of the ‘Proceedings’ it was our sad duty to announce the death of Mr. H. W. Bates, who had filled the office of Assistant Secretary to the Society for twenty-seven years. Mr. Bates, it is well known, returned from South America with a constitution enfeebled by the hardships he underwent in the interests of science, during his eleven years’ work on the Amazons. He had, in consequence, always to be careful, and so husbanded his strength that he was rarely absent from duty through illness. In the summer of last year his sufferings became more acute than usual. Notwithstanding all the measures that were taken he got weaker as the year advanced, and those who were in the habit of seeing him noticed a great change in his appearance. About the beginning of February he was attacked by influenza, complicated with bronchitis, which his reduced strength was not able to resist; he succumbed on the morning of February 16th, at the age of 67 years.

Bates was born at Leicester on February 8th, 1825, the son of a manufacturer of that town, and he was intended for a business career. He was a man of many sides and many sympathies. In order to do justice to his character and work in these pages assistance has been sought from various quarters. Mr. Frederick Bates has kindly written the following interesting sketch of his brother’s school-days and early youth:—

Almost my earliest recollections of my late brother are of the time when he was a scholar at the boarding-school of Mr. H. Screaton, at Billesdon, a large village about nine miles from Leicester. This was at that time considered one of the best schools in the county. I well recall to mind how we (brother John and myself) used to look forward to the time when the holidays would bring him once more amongst us; for even in those early days we looked upon him as our dear “guide, philosopher, and friend,” and not without good reason, for he ever sought to lead us, in his kindly, genial way, to better and higher thoughts and deeds.

At this school he finished what may be called his scholastic education; and in those days the education of tradesmen’s sons did not extend beyond the age of thirteen or fourteen years. He was afterwards apprenticed to Alderman Gregory, bonery manufacturer, of Halford Street, Leicester. Those were “hard times,” for his working hours were from 7 a.m. to 8 p.m. Many a time in his earlier apprenticeship days have I accompanied him to open the warehouse, and helped him to “sweep up”:

my reward being the string and waste that were on the floors of the warehouse, which were always the perquisite of the apprentice. It was during this apprenticeship that my brother laid the foundation of all that he afterwards became.

Fortunately, at this period we had in Leicester an institution called the Mechanics' Institute, which possessed a good library, and had numerous evening classes, with competent masters. Under the liberal and enlightened management of such men as Mr. Riley and Mr. J. F. Hollings, this rapidly developed into a large and magnificent educational institution. My brother became a member, entered the Greek, Latin, French, Drawing, and Composition classes, and worked with an energy and perseverance that soon brought him to the front in all. In public assembly, he received at the hands of the president, Mr. Riley, the first prizes for Greek and Latin, was second only in French and Composition (essay writing), and was no mean draughtsman. German he learnt while abroad. His capacity for work at this time was prodigious. As I have stated, his business hours were from 7 a.m. to 8 p.m., and yet he was enabled by his indomitable will and energy to master all the subjects named in the very limited time left at his disposal. It was no uncommon thing for him to work till midnight and yet be up and at work again at 4 a.m. Often used he to awaken me in the early morning to "hear" him his lessons in the Greek or Latin grammar, and when he was translating Homer, he set himself to translate so many lines before going to the warehouse (at 7 a.m.); if he could not accomplish this by rising at 4 a.m. he would begin at 3 a.m., for *the task must be done*.

His enthusiasm for his work was unbounded: as witness he had written on the fly-leaf of his Latin grammar:—

"I am as fond of Latin
As women are of satiu."

During all this period he was a great reader. I remember his saying that no one ought to make any pretensions to be considered a reader who had not twice gone through Gibbon's 'Decline and Fall of the Roman Empire.' He also devoted some time to music (of which he was always exceedingly fond). He became a member of a glee club, and learned to play the guitar. Having a fair baritone voice he used to accompany his songs on that instrument.

It was whilst attending the classes before mentioned that he formed the acquaintance of certain gentlemen (notably Mr. John Plant, now and for many years past the curator of the Salford Museum, his brother James Plant, now practical geologist of Leicester, and the late Mr. James Harley, ornithologist) with strong tastes for the pursuit of natural history. I have no recollection of his specially pursuing any other branch than entomology; although I well remember he could give you the names of all the wild flowers that were met with in our rambles. Like most collectors he commenced with the Lepidoptera, but soon abandoned these for the Coleoptera. Of course I was soon enlisted as one of his collectors, and all the fine Saturdays of my schoolboy days found me scouring the lanes and woods of Charnwood Forest in the pursuit of butterflies. Never shall I forget his radiant joy when I returned one Saturday evening with a pair of the "White C" butterfly (*G. alba Gallum*); nor when he once came bounding in, shouting in exultation, with his first capture of a "Tiger" beetle (*Cicindela campestris*), made in Ansty Lane.

We were living at this time in Queen Street, in a house built by our father, and a small room was apportioned to my brother as a "study." What happy hours have we spent therein, in those early entomological days when all to us was new and strange and wonderful and beautiful! Even now, after the lapse of fifty years, my heart swells with emotion at the remembrance.

Our earliest collections, I well remember, were stored away in such places as table and wash-hand stand drawers. Our collecting nets too were very primitive—a hoop of wire soldered into a tin socket to hold a stick. This was carried on an expedition for convenience under our coat-backs. Frequently were we laughed at by the passing villager who would ask us if we had stolen a plate and hid it up our backs. In those days the best collecting grounds were the parts of Charwood Forest owned by the old Earl of Stamford, who did not strictly preserve for game. Consequently we had easy access to all the rich woods and places where insects most abounded. For my brother business working hours were many, but holidays were few. Good Friday was always chosen as the first grand opening day of the season. With what keen anxiety would my brother watch for propitious weather on that day! I can still see the happy group starting on one of those mornings, full of glee and joyous spirits. My brother used habitually to write a descriptive account of all these expeditions; he would also sketch and write out descriptions of all the principal insects captured. It was no doubt this habit that contributed largely to his after facility in descriptions, which was remarkable.

The old alderman to whom my brother was apprenticed died several years before the expiration of the term of apprenticeship. He then managed the business (on a smaller scale) for the alderman's son (who was not at all a business man), but this did not last long. By this time he had formed a very extensive collection of British beetles and was in correspondence with all the chief coleopterists of the time. The study of the Coleoptera was a very different thing in those days to what it is at the present time. Then there was nothing much to enable the worker to determine his species but Stephens's 'Manual,' and all who have puzzled over that book will know the difficulties. Now there are any number of good descriptive works, both British and foreign. I think the first contribution my brother made to entomological literature was a short paper entitled 'Note on Coleopterous Insects frequenting Damp Places,' which was published in the first number of the 'Zoologist,' and was dated Queen Street, January 3, 1843. Among the friends made about this time was Mr. E. Brown, of Burton-on-Trent, who interested himself in procuring my brother a situation as clerk in Messrs. Allsopp's offices at Burton-on-Trent. He remained there until he had made arrangements to start on his memorable expedition, in company with Mr. A. R. Wallace, to the Amazona. The post at Allsopp's was never congenial to him; he fretted under it.

At this time, and for long before, my brother was not in good health; his circulation was bad: his body had to be rubbed with coarse flesh-gloves, &c.—to undergo a sort of "massage" in fact—and his face was disfigured with spots. I can see him now brewing decoctions of Peruvian bark to take as a remedy. It was thought by his medical adviser that the journey to the Amazona might possibly be beneficial, and it was this which alone reconciled his mother (then in failing health) to his going. There is no doubt that the terrible overwork he had voluntarily undergone had injured him. His digestion was never good; in this he but shared in the lot of all his three brothers.

And now the brave, bright spirit has gone, and mortal eyes shall look upon his face no more—the good and loving brother, the firm and faithful friend, the gentle, courteous, genial, unassuming gentleman, scorning all pretence, hating all forms of cant and humbug, void of all worldly ambition that did not well become a man, reticent as to all honours that were conferred upon him. His brothers never knew from himself of any of these, and the order he received from the late Emperor of Brazil has never been seen by us, nor did he ever mention it in our presence. I need say no more.

Although zoology was the primary object of the expedition to the Amazons, much geographical and ethnological information was acquired. Bates and Wallace arrived at Para on the 26th April, 1848, and Bates resided there nearly a year and a half altogether, making it his headquarters, from which he started on short excursions into the interior, returning to refit and despatch his collections to England. At Para he virtually remained until the 6th of November, 1851, when he started on his long voyage to the Tapajos and the Upper Amazons, which occupied a period of seven years and a half.

It was from Para that the two travellers made an excursion down the river Tocantins and visited the town of Cametá. Nothing can excel the interest to be found in this great river highway, with these numerous tributary streams, and we obtain throughout the narrative of the expedition descriptive paragraphs, which bring the scenes vividly to our minds, and afford us much information on the complicated river geography. In September 1849, Bates started on his first voyage up the Amazons, in a small sailing vessel (for steamers were not established until the year 1853) and reached Santarem, which he subsequently made his headquarters for a period of three years, but on this journey he pushed on to Obydos, about 50 miles further on. Here a trader was found who was proceeding in a cuberta laden with merchandise to the Rio Negro, which was arranged to frequently stop on the road, and Bates securing a passage once more increased his knowledge of the Amazons. The destination of the boat was Manaus, or the Barra of the Rio Negro, a spot rendered memorable by the visit of Spix and Martins in 1820. After a short stay Bates proceeded to Ega, the first town of any importance on the Solimões river, which he reached on the 26th March, 1850. Here he spent nearly twelve months before returning to Para, and thus finished what may be considered as his preliminary survey of the vast collecting ground to be almost called his own.

In November 1851, he again arrived at Santarem on a second journey, where, after a residence of six months, he commenced arrangements for an excursion up the little-known Tapajos river, which in magnitude stands sixth amongst the tributaries of the Amazons. A stay was made at the small settlement of Aveyro, and from this spot an expedition was made up the Cupari, a branch river which enters the Tapajos about eight miles above it. At this time Bates was thrown in contact with the Mundurucás Indians and was able to acquire much valuable ethnological information. It was also during this second journey that the long stay was made at Ega, and the many excursions in its neighbourhood resulted in so much general knowledge, both zoological and geographical. Bates returned again to Para on the 17th March, 1859, after an interval of seven and a half years in the interior, a wreck of his former self. No constitution could withstand the continued strain of climate, poor living—frequently actual hunger—and exposure which the real naturalist so long endured,

and we may rest assured that nothing but physical prostration actually brought about the long deferred return to England and this abandonment of the anticipated visit westward "to gather the yet unseen treasures of the marvellous countries lying between Tabatinga and the slopes of the Andes."

After all, our ideals are dominated by our physical capacities; successful exploration is not for the enthusiast who possesses a weak constitution, and even the zoological furor of a Bates was at last conquered by the effects of privations that few could have withstood so well, but which rendered him almost an invalid for the remainder of his days.

The following letter addressed to the Foreign Secretary of the Society by Baron de Santa Anna Nery, Honorary Corresponding Member of the Society, shows that even yet the name of Bates is remembered in the Amazons.

Paris, le 8 mars, 66 Rue Mozart.

My Lord,—On my arrival from Brazil, where I have been passing the last five months, I learn from the 'Proceedings of the Royal Geographical Society' the sad news of Mr. Bates's death. I feel the greatest grief for his loss, and I wish that not only his family, but also our Society, should rest assured that in all Brazil, and especially in the Amazons, his death will be deeply felt. Native of that vast and far off province, as a child I learnt to admire the author of the 'Naturalist on the Amazons.' Mr. H. W. Bates was one of the first to foretell the splendid future of the Amazonian Valley, and to describe its bewildering splendours. Although his voyage to the Amazons was undertaken in his early manhood, time has not been able to efface his memory, and many an inhabitant of our regions still retains a vivid remembrance of the English naturalist. In 1889 I was fortunate enough to make his acquaintance, and great was my pleasure to find that he also remembered with delight his bold and perilous excursions in our forests, and recalled readily to mind episodes of that period of his life. On that occasion Mr. Bates offered me his portrait. I am convinced that the two Provinces of Pará and the Amazons will make it a point of honour to place in their Congress halls a large sized reproduction of this photograph, as a homage due alike to a modest *savant* and to English science.

In conclusion, may I ask your Lordship to be the interpreter of my sentiments on this occasion, towards our Society and the family of the illustrious deceased.—I have the honour to remain, my Lord, your Lordship's obedient servant, BARON DE SANTA ANNA NERY, Honorary Corresponding Member of the Royal Geographical Society.

Sir Joseph D. Hooker, K.C.S.I., C.M., F.R.S., sends the following interesting reminiscences of his intercourse with Bates immediately after the latter had returned from the Amazons:—

I first had the pleasure of seeing him—and to see him was to know him, for a more translucent character I never encountered—was at Mr. Darwin's at Down, very shortly after his return from the Amazons. We there spent several days together, and I can remember none more enjoyable. There was such a fascination in his manner and character, and such a boyish hearty enjoyment of his return to his native country and all that it contained from Shakespeare to Punch, and from Darwin to the merest bug-hunter (so long as the work was honest). Darwin's

appreciation of him was whole-hearted and all-round, and Bates's first visit to Down was marked with a white stone in his host's memory, as in mine, and often recurred to by us. I have over and over again compared and contrasted these two friends, and always, if I may be so presumptuous as to record it, to the advantage of both.

The following contribution by Mr. W. L. Distant, an old friend of Mr. Bates, and himself a well-known entomologist, will afford some idea of the work accomplished by our late Secretary in natural history, and especially in entomology.

In a biological epoch to be known hereafter as the Darwinian era, the name of my late friend Mr. H. W. Bates is indissolubly connected with that early band of disciples associated with the great expounder of the law of evolution by natural selection. Darwin was himself an entomologist, but specialism could find no place in the encyclopedic attention he paid to all branches of biological knowledge. To Bates belongs the honour of considerably advancing entomology on a philosophical basis, and it is to his entomological work and his influence on the progress of entomology that these lines are proposed to bear witness.

In entomology, as in most other biological sciences, there are usually three distinct kinds of workers: the collectors or field naturalists, the philosophical observers or recorders of evolutionary facts and arguments, and those who devote themselves to the systematic classification of the insects. These branches are seldom followed by the same worker; the methods to be pursued are so different, the tastes inspiring each so varied, whilst the pursuit of one frequently leads to a disparaging view being held of the others. Bates almost uniquely proved himself a master in each, and with the exception of his old travelling companion Wallace, is approached in that respect by scarcely another living entomologist. It was an eventful time when the two naturalists sailed for Para. The vast collections of insects now existing in public and private museums, and which can be so readily consulted, were then of much smaller dimensions. It was the age of the iconographer of remarkable forms, the material for the exhaustive monograph being still unobtainable. All reasonable attempts to understand the geographical distribution of animals awaited faunistic catalogues, which in a complete form were impossibilities. Whole tracts of the world, if not geographical expressions, were zoologically unknown. The few travelling naturalists of those days had scarcely been trained to combine the collection of a specimen with the observation of a fact. When Bates started, Darwin's 'Voyage round the World,' following Humboldt's 'Personal Narrative,' must have excited the keenest interest in philosophical biology; naturalists seemed almost to revive as from a sleep, and nature's methods were beginning to be studied as well as her objects. The 'Origin of Species' had still to appear, and Bates accepted a self-imposed commission to unravel the natural history of the Amazons.

During the eleven years that he passed collecting in this glorious though somewhat unhealthy region, communications from his pen appeared from time to time in the 'Zoologist,' and we can form an idea of the assiduity with which this work was carried on. In one of these letters we have a personal account of his own equipment in the neighbourhood of Ega:—"Between 9 and 10 a.m. I prepare for the woods: a coloured shirt, pair of trousers, pair of common boots, and an old hat, are all my clothing; over my left shoulder slings my double-barrelled gun, loaded, one with No. 10, one with No. 4 shot. In my right hand I take my net; on my left side is suspended a leathern bag with two pockets, one for my insect-box, the other for powder and two sorts of shot; on my right side hangs my "game bag," an orna-

mental affair, with red leather trappings and thongs to hang lizards, snakes, frogs, or large birds; one small pocket in this bag contains my caps, another papers for wrapping up the delicate birds; others for wads, cotton, box of powdered plaster, and a box with damped cork for the Micro-Lepidoptera; to my shirt is pinned my pin-cushion, with six sizes of pins."

Of the vast quantities of specimens thus collected we obtain occasional glimpses as when writing to his agent, Mr. Samuel Stevens, of his five months' trip to St. Paulo, he states that he altogether brought 5000 specimens of insects from there: "Amongst which there were 686 species new to me of all orders, 79 being new species of Diurnal Lepidoptera." But insects did not altogether monopolise his attention, as we find him at Santarem "very anxious to hear of the safe arrival and profitable sale of the barrel of fishes, &c.," a branch of zoology in which he did not apparently receive the warmest support, as after stating what could be done in those streams where there "are thousands of species," he adds, "I only want encouragement." His first communication to the 'Zoologist,' in 1852, was an excellent account of the Douroucoul monkey (*Aotes trivirgatus* Humb.), and his second paper of the same year concludes with a remark on the fertility of the lands of the Upper Amazons—"In the hands of the Anglo-Saxons, at some future day, what a wealthy country it may become!" This view he again expressed to the writer only two months ago; forty years had not altered his opinion, though the movement is still deferred. The collections thus formed were unrivalled, and one can still hear echoes from the small circle of contemporary naturalists—now alas! so small—of the intense interest with which Bates's consignments were anticipated. The banks of the great river were at last telling the tale of their inhabitants to the zoologists of Europe, for the collections were widely circulated, and long before the publication of the 'Naturalist on the Amazons' the name of Bates was indelibly connected with the region of his long sojourn. Not only did the expedition effect a history of the natural treasures of this interesting zoological province, but it also stimulated the zeal of many private and wealthy collectors, who subsequently promoted and assisted other zoological enterprises.

Had Mr. Wallace not visited the Amazons, he might have never made his memorable journey through the Malayan Archipelago. These eleven years with tropical nature bore fruit on all sides, and the observations and reflections made on the banks of the mighty stream created the philosophical work which succeeded the collecting epoch.

Of his 'Naturalist on the Amazons' there is little to be said, for the book is universally read, no naturalist's library is without it, and it will go down to posterity between Darwin's 'Naturalist's Voyage,' and Wallace's 'Malayan Archipelago.' Bates has often told the writer of Mr. Darwin's advice before he commenced the work: "Write the book carefully and then go over it again, crossing out every sentence that looks like particularly fine composition." One cannot read many pages without noticing the echo of Darwin's "Natural Selection" only published a few years previously. Butterflies are no longer the simple ornaments of a collector's cabinet, or an illustration of the teleologist, but on their wings the author sees that "nature writes, as on a tablet, the story of the modification of species, so truly do all changes of the organisation register themselves thereon." This remark obtains confirmation from his celebrated memoir which had been recently published

* In the preface to his 'Naturalist on the Amazons' he has given an approximate enumeration of the total number of species in all orders collected during the expedition as 14,712; and these received the attention of the late Dr. Gray, Dr. P. L. Selator, Dr. A. Günther, Dr. Bowbank, and numerous capable entomologists.

by the Linnean Society, entitled 'Contributions to an Insect Fauna of the Amazon Valley,' but which really gave to the scientific world the phenomenon of Mimicry and its philosophical explanation. It is needless to re-state the now well-known facts of some inedible butterflies being mimicked in appearance by other species to which they had no close relationship; the protection thus acquired by the mimickers, and the brilliant hypothesis—if such it can still be called—of the process being due to a course of natural selection. It was seen at once to possess the merit of a true scientific discovery, for it gave the explanation to more facts than those advanced by its author. It received the immediate and unconditional imprimatur of Mr. Darwin. At Cape Town Mr. R. Trimen applied the doctrine to some South African species, whose mimetic resemblances had hitherto been simply a wonder or a curiosity, but which were thus seen to be due to the same natural causes.

Mimicry is now an established element in Darwinism, and like its parent source has still a very few sceptics among the old school of naturalists and a few too adventurous supporters. The enunciation of the phenomenon of mimicry has had an immense effect on entomology. Natural selection as an evolutionary process was held by many entomologists as a creed, but seldom used in attempts to solve the numerous problems of the insect world. "Mimicry" came forward as a distinct challenge, it affirmed the teachings of Darwin, and afforded a new application of the law he enunciated. What the ultimate extension of the theory may disclose one cannot foretell; whether some portions of its extreme application altogether met the views of its author has never been publicly stated, but it is possible and probable that the enthusiastic investigations now being made to enlarge the area of its dominion may disclose other processes of the law of natural selection, besides the undoubted fact of mimicry. In that event the philosophical influence on entomology already exercised by Mr. Bates will be enhanced.

In 1864, Mr. Bates contributed to the 'Journal of Entomology' an important paper on the classification of the Rhopalocera or Butterflies, which was an enlargement and elaboration of similar views which he had published three years previously. In entomology as in most other branches of zoology, systematic classifications are often unavoidable but convenient modes of arrangement for a monographer rather than the elucidation of a natural system on evolutionary principles, though the beauty of a classification is shown when based on those characters which exhibit a progressive modification in structure, or in other words exhibits the evolution from a simple to a more specialised type. The epoch-making character of the arrangement proposed by Mr. Bates is best proved by the fact that it has since been universally followed, and this in recent years when a large number of faunistic works on the Rhopalocera have been written in various lands and with a wealth of material formerly unknown. This classification reversed the previously understood sequence in the families, and still remains the most philosophical and natural system yet attained in the arrangement of any order of the Insecta. This paper is a model of the philosophical treatment of a purely systematic subject.

As a systematic and descriptive writer Mr. Bates has been a constant contributor to entomological literature for the last thirty years. On his return from Brazil he published several papers on his Rhopalocera collections, and contributed a Memoir to the Linnean Society on the Plasmidae, a group of Orthopterous insects. But in Coleoptera he was a great authority, certainly the greatest in the Groedagous section of the order. His collection of these beetles is probably the finest in the world, and undoubtedly the best worked out. If anyone sought the names of small and obscure Curabidae, the advice was always, "You must go to Bates," and it is not beyond the truth to say that he had corresponded with every contemporary coleopterist. His greatest systematic publication will be found in the three volumes he

contributed to the 'Biologia Centrali-Americana,' and in the initial arrangements of that vast undertaking his advice was greatly valued.

As a collector or field naturalist, a philosophical observer or a systematic writer, Mr. Bates has equally filled a commanding position in the science he loved so well, and with this rare combination of endowments it may be claimed for his memory that he was probably the greatest and certainly the most respected entomologist of his time. His advice was always sought and freely given, and few entomologists visited London without taking an opportunity to meet him.

Thus a friend has passed away who had the rare privilege of being equally loved as a man and honoured as a naturalist.

Mr. Edward Clodd, author of 'The Childhood of the World,' 'The Story of Creation,' &c., writes as follows on some of the more general aspects of Mr. Bates's character. Mr. Clodd was for several years Mr. Bates's near neighbour and intimate friend.

While the signal and original services of Mr. Bates to natural history, both in the collection and, what is of greater importance, the interpretation of materials, are the chief credentials of his title to a place among the savants who have supplemented and strengthened the theory of natural selection, there are other sides of his character on which they who valued this greater and more prominent work of his life will also love to dwell.

To the few who knew him outside official duties; the congenial company that gathered at the Kosmos Club or at the gossipy luncheon-table, the 'polygonal' or many-sided aspects of his mind, with its inclusion of all human interests and sympathies, were the striking features of his unassertive individuality. But, perhaps, to know him at his best, and pierce the thick husk of his modesty, was when, the evening employment of beetle-sticking over, and the frugal supper eaten, the pipe was lit and talk started, sometimes on some topic of the day, but, more often, on some subject suggested by his wide and varied reading. For, unlike Darwin, who tells us in the autobiography which is prefixed to his 'Life and Letters,' that for many years he "could not endure a line of poetry and found Shakespeare intolerably dull," even music disconcerting him and natural scenery giving him little delight, Bates revelled and rejoiced in all these ministers to the completeness of life. In fact, he was far the richer of the two both in mental grasp and equipment, and such letters of Darwin to him as have survived evidence that Bates's masterly suggestiveness impressed him profoundly. Darwin also tells us that the fiction which interested him was not of a high order. By contrast, Bates's chief favourites were Thackeray and Thomas Hardy; he loved the one for the pathos and insight which the shallow folk who call Thackeray cynical cannot see underlying the seemingly cold analysis of act and motive; he loved the other for the sweet country air that blows through every page. He loathed the modern school of didactic and introspective fiction.

The love of Homer, which his brother, in the very interesting notes of his boyhood, tells us he learned to read in hours stolen from sleep before sweeping out the warehouse, never cooled; he preferred the Ionian hexameters to the paraphrase of Pope or the prose of Myers and Lang. Milton and his more immediate successors were favourite authors, but when Matthew Arnold's poetry was brought under his notice, he felt as Keats felt when first reading Chapman's Homer, "a new planet swam into his ken." Its classical note, its severity of restraint, its austereness and surefootedness, its gospel of cheerful acceptance of the inevitable, led him to give Arnold the chief place in his assessment of modern poets.

The remarks which his brother quotes about Gibbon have an added interest, because Bates had been steadily re-reading that immortal book for months past, and

had reached the middle of the last volume when he died. He became quite "the old man eloquent" in following the great historian in his stately march through the most pregnant ages of the world's history, dwelling especially on the bloody struggles between the factions of Christendom and the Arabian conquests and influence. But Dean Milman's notes irritated him; he thought them, for the most part, an impertinence.

Considering how full his days were with office routine, and how his spare time was trampled upon in the editing of this Journal, it is surprising how well he kept himself abreast of the latest science. Doubtless, in this, his early business training had given him the secret of method. Therefore little escaped him. Acquaintance with the new evidence in support of the European origin of the Aryan race; with the arguments of Weismann in his 'Essays on Heredity'; with the less lucid exposition of the theory of Physiological Selection by Prof. Romanes, followed in quick succession. Weismann's book exercised him keenly; his verdict on it was "not proven," and he inclined to that verdict being upheld. Romanes's paper partly repelled him by its obscurity of style, but chiefly as reversing the method of the master whose theory it professed to supplement, in too hurried publication of a theory which only long and patient observation of a wide group of facts can support or controvert.

This general interest in various branches of knowledge evidences how Bates had escaped from the limitations which hem in the mere specialist; so that, however impaired his bodily vigour, there was no trace of mental ossification; rather of unwearied powers of receptivity. There was a wonderful freshness in all that he said, and a wonderful charm in the way he said it. His sentences were broken by curious hyphen-like pauses. But how perfect they were in construction; clear-cut, pure English, so that, taken down (alas! that they were not taken down) not a word need have been altered or transposed. Never did the listener leave without taking away some fruitful idea; some fresh aspect of familiar matter, evidencing the power of the speaker in seizing upon the relation of a particular fact or theory to the totality of knowledge.

But, even more than the gentle voice, the winning smile, and the affectionate greeting, the friends of Bates will cherish as the chief lesson of his life, especially in an age of "Sturm und Drang," of pushing to the fore, of clamour for priority of discovery, the wholesomeness of possessing the soul in patience, and of work done in quiet, finding alike impulse and contentment in the thought that so far as the work is sterling and contributory, "natural selection" will take care of it.

Mr. Clements R. Markham, C.B., F.R.S., who became Honorary Secretary of the Society in 1863 (the year before Mr. Bates was appointed Assistant Secretary), and filled the office for twenty-five years, contributes the following reminiscences of the colleague with whom he was so long and so intimately associated:—

It would be difficult to estimate the benefits that the Society has derived from the services of Mr. Bates since he became its Assistant Secretary in 1864, because they made themselves felt in so many directions and in so many ways. During the six years of his service, when the Society's premises were in Whitehall Place, and the Presidency was held by Sir Roderick Murchison, his active assistance was directed to the improvement of the organisation in the Office, Library, and Map Room; to the development of a better system of keeping and presenting the accounts; and to a more popular and more agreeable plan in the preparation of papers to be read at the meetings. By the able and judicious way in which these improvements were conceived and persevered in, Mr. Bates very early showed how admirably he was

fitted for the place, and both Sir Roderick and the Secretaries relied more and more upon him as their main stay and support in the work of maintaining and advancing the efficiency and prosperity of the Society. Mr. Bates's usefulness was, perhaps, most felt in the assistance and advice he gave to travellers, and, indeed, to every one who came to him on geographical business. They invariably found in him not only a man ready to impart information and advice, but a trustworthy and sympathising friend. It was, however, in times of difficulty and on occasions needing the exercise of tact and conciliation that Mr. Bates's valuable qualities made themselves most felt by his colleagues. There was such a combination of circumstances at the meeting of the British Association at Bath in 1864, when great pressure of work was ably met, arrangements exactly suited to the needs of the moment were made, and conflicting interests were reconciled, quietly, smoothly, and with admirable judgment. Indeed, the Geographical Section of the British Association has owed its success and efficiency in a great measure to Mr. Bates during the many years that he has acted as one of its Secretaries.

The removal of the Society's premises, in 1870, from Whitehall Place to 1, Saville Row, was another occasion when his organising and administrative abilities were specially displayed, and all who assisted in the difficult and arduous work of moving were deeply impressed by them. It was, in one way, a sad time, because the President, to whom the Society owed so much, had been struck down by paralysis. He was never able to enter the new building, but he drove to the door and looked in from his carriage, while Mr. Bates explained all the arrangements in detail. It was a few days after this melancholy visit that Sir Roderick expressed his high sense of Mr. Bates's services, and his gratitude for the efficient help he had always received from him.

During more than twenty years since the removal, Mr. Bates has rendered the same services, and each successive President has endorsed the feelings expressed by Sir Roderick Marchison. If the admiration of his friends and colleagues could have been increased in any way, after a long experience of his high qualifications and of his goodness of heart, it would have been by the conscientious way in which he invariably stuck to his work, and refused to allow himself any relaxation, in spite of delicate health and the urgent need for rest which he must have felt. In the work of editing the Society's Transactions, which devolved upon Mr. Bates from the period of his first appointment, he was unwearied and most successful in obtaining information bearing on geographical work from every quarter and from all parts of the world; he supplied invaluable hints and suggestions to the authors of papers, and he smoothed over difficulties with never-failing tact. His own rich stores of information were invaluable to all who needed help in their work, and over and over again they enabled him to supply a missing clue in some difficult inquiry, or to elucidate and piece together isolated facts, and show their bearings on each other. In all their intercourse with him, his colleagues, as well as the general body of geographers and travellers, have always been as much impressed by his ability and knowledge, and by the soundness of his judgment, as by that sympathising and kindhearted way of giving his opinion or advice which endeared the late Assistant Secretary to all who came in contact with him. After an acquaintance extending over close upon thirty years, the present writer is glad to have an opportunity of recording these recollections of his lost friend.

Mr. Francis Galton, F.R.S., who had known Bates from the time he became connected with the Society, writes as follows about his late friend:—

If reiteration left a deeper impression than a single clear statement, I would

repeat what other biographers of Mr. Bates have already expressed, as to the singular and valuable services he rendered to the Geographical Society, and to the furtherance of geography in England. I would also have willingly dwelt on the thoroughness of all his work, on his kindly appreciation of the merits of others, on the sympathy which gave a singular charm to his relations with young travellers, to his modesty, combined as it was with good sense, well-considered judgment, and with firmness. On these points which have been justly emphasised by others, I abstain for that reason alone from saying more, and shall endeavour only to supplement their remarks by a few recollections that seem worth putting on record. I had taken an active part in the affairs of this Society many years before the appointment of Mr. Bates, and can remember well how important it had become to us to have an orderly and efficient Secretary, and how difficult it was to find what we wanted. At this juncture the strong recommendation of Mr. Murray, the publisher, was the fortunate circumstance that determined the election of Mr. Bates, of whose merits otherwise than as an enterprising traveller, as a naturalist of high distinction, and as a charming writer, most of us on the Council were ignorant. Mr. Murray assured us in addition to all this, of Mr. Bates' methodical and orderly ways and of his business-like habits, without which the other qualifications, high and rare as they are, would not have sufficed to make a good secretary.

It is to be regretted now that the services of a man who did such admirable geographical work, both in the field and at his writing-table, were not conspicuously recognised during his lifetime by our Society. It is to be presumed there was a feeling that the most appropriate time for doing so would arrive when advancing years should induce him to seek repose in an honoured retirement; but death has now intervened. His merits were thoroughly appreciated by all those for whose good opinion he was likely to care. I may be permitted to mention that I was requested by the Council of the British Association on one occasion, to strongly urge his acceptance of the Presidency of the Geographical Section. It was a post from which his retiring disposition evidently shrank; but he refused to accept it on the grounds of uncertain health, and a painful malady which was especially apt to harass him during the later summer months, and to interfere with continuous work. During my long acquaintance with Mr. Bates, and frequent consultations with him, I have found him from first to last the same. He was always a frank and helpful adviser, kindly natured in taking the best view of things, and perfectly upright and trustworthy. I am painfully conscious that I have lost in him a real friend.

In conclusion, one word may be permitted to the colleague and intimate friend for many years, who has had the honour of being appointed to Bates's vacant office. Bates's fellow-officials in the Society regarded him with unreserved admiration, affection, and respect. He, as their chief, invariably showed himself sensitively considerate of their feelings; while they in their turn shrank from doing anything which would give him trouble or vex his genial soul. It is not likely that the chair of the Assistant Secretaryship will ever be filled by his like again.

Of honours Bates received many; no one knows how many, for he never spoke of them. The only time the present writer ever saw the Order he received from the late Emperor of Brazil was at one of the Society's conversations; it was only by accident he got a glimpse of it concealed beneath the lapel of Bates's coat. He was made a Fellow of the Linnean Society in 1871, and of the Royal Society, strange to say, only in 1881. Of the Ento-

nological Society he was twice President. Bates was married in 1861. His wife survives him, as also do one daughter, who is married, and three sons, two of whom (the eldest and the youngest) are farmers in New Zealand, while the second son is an electrical engineer.

Sir John Coode, G.C.M.G., F.R.G.S.—We regret to record the death of the eminent engineer, Sir John Coode, which took place on March 2nd at Brighton, after a long illness. Sir John, who was born in 1810, came of a distinguished family which has been resident in Cornwall for many centuries. John Coode was educated at the grammar school of his native town, and early in life chose the profession of civil engineer, in which he soon distinguished himself. He began his career under the eminent engineer Rendell. As early as 1847 he was appointed resident engineer at Portland harbour and breakwater, and, on the death of Rendell, engineer-in-chief in 1856. He continued in charge until the completion of this great work in 1872, when he received the honour of knighthood. He was for many years consulted by the Board of Trade and other Government departments on matters connected with harbours, docks, rivers, and drainage. Many important works were carried out from his designs, including the great breakwater and docks at Cape Town, the breakwater at Colombo, the improvement of the river Bar, in Ireland, the harbours of the Isle of Man, and similar works elsewhere. He was a member of the Royal Commission on Harbours of Refuge in 1858-59, and of the Royal Commission on Metropolitan Sewage Discharge 1882-83. Among his other public services it may be mentioned that he served as a member of the International Consultative Commission on the Suez Canal in 1884-85. He was President of the Institution of Civil Engineers in the years 1889 and 1890. He was one of the Royal Commissioners for the Colonial and Indian Exhibition of 1886, and acted as president of the engineering section of the International Congress on Hygiene, which held its sittings in London in August last. Sir John Coode twice visited the Cape, the Australian continent, and New Zealand, at the request of colonial Governments, and many of the harbours constructed or in progress there are from his designs. Sir John became a Fellow of our Society in 1878. He married, in 1842, Jane, daughter of the late Mr. William Price, of Weston-super-Mare.

REPORT OF THE EVENING MEETINGS, SESSION 1891-2.

Seventh Meeting, 14th March, 1892.—The Right Hon. Sir M. E. GRANT DUFF, *a.c.s.i.*, President, in the Chair.

ELECTIONS.—*R. Shafto Adair, Esq.; James W. Crafer, Esq.; Rev. Thomas W. R. Crookham; Ernest Gedge, Esq.; Rev. John Highwood, B.A.; Esme Howard, Esq.; Edw. Wingfield Humphreys, Esq.; F. J. Wootton Isaacson, Esq., M.A.; Henry Lowenfeld, Esq.; H. Berkeley Score, Esq.; E. A. Tanqueray, Esq.; Harry James Veitch, Esq.*

The paper read was:—

"Sierra Leone and the Interior, to the Upper Waters of the Niger." By G. H. Garrett, Esq. This paper will be published in an early number of the 'Proceedings.'

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—December 4th, 1891: Vice-Admiral Vioxes in the Chair.—After the correspondence had been read, M. Willems gave an account of the journey undertaken by him in company with M. Rousson in Southern Patagonia and Tierra del Fuego.

—December 18th, 1891: M. DE QUATREFAGES, of the Institute, in the Chair.—This was the second general meeting of the year. M. Maunoir, the General Secretary, read extracts from his annual report upon the condition and operations of the Society, and on the progress of geographical science during the year. This report will appear *in extenso* in the quarterly Bulletin.—M. E. A. Martel read a paper upon his subterranean researches in the region of the Causse.

—January 8th, 1892: Vice-Admiral Vioxes in the Chair.—The meeting was principally occupied with the reading of correspondence.—Dr. Leitner gave a short account of his travels in the Pamir and Central Asia.

—January 22nd, 1892: M. CHEVREUX in the Chair.—The Society received intimation of the death of its President, M. Quatrefages de Bréau.—M. the Abbé Hauron gave an account of his journey in the centre and south of Tunis.

—February 5th, 1892: M. CHEVREUX in the Chair. A letter was read from M. Lionel Dôle, dated 11th November, 1891, from Shesheké, on the Zambezi, in which he expressed his intention of further ascending the river to the north.—A communication was received from M. Meynars d'Estrey announcing that a new lake had just formed in the Colorado desert, to the north-north-west of the point where the river Colorado empties itself into the Gulf of California. The surface of its waters is about 260 feet below the level of the Pacific. It is stated to be 30 miles in length and 8 miles broad. A second lake 100 miles to the south had also formed. There is no doubt that the waters of the river Colorado have penetrated into these basins and formed these lakes.—In conclusion M. E. Blanc gave an account of his recent travels in Central Asia.

NEW GEOGRAPHICAL PUBLICATIONS.

ASIA.

Bishop, Mrs.—*Journeys in Persia and Kurdistan.* London, John Murray, 1891: 2 vols. Bro, vol. i. pp. xiv. and 381; vol. ii. pp. 409. Price 24s.

The first part of Mrs. Bishop's journey, up the Tigris from Basrah to Baghdad, was made over a well-beaten track which has been often described by travellers, but the information which the authoress affords respecting the navigation of the Karun river and the prospects of Persian trade along the trade-route from the Gulf to Tehran via Ahwaz and Shuster is full of interest. There is little doubt that this will ultimately become a regular and prosperous route for commerce. The description of Baghdad is interesting, and the just observation that "it is certainly for Turkey a busy, growing, and passably wealthy nineteenth-century capital," will be a revelation to those who have thought of it as the miserable and squalid wreck of the ancient "City of the Caliphs."

Mrs. Bishop's journey from Baghdad to Tehran was undertaken in the coldest part of the year, when travelling all day and sleeping in open rooms in

caravanserais, and in *belu khaanas* is far from enjoyable, and in crossing the higher passes of Zagros the cold was intense, and the traveller and her servants suffered great hardships. At Kirmanshab Mrs. Bishop resided at the home of the British Agent, or *Vakeel*, a man of considerable capacity and great influence, whose grandfather was a trusted servant to Sir Henry Rawlinson. The description of the way in which a Persian governor obtains an appointment, and the precautions he adopts in order to retain it, gives a considerable insight into Persian methods of government. "If a governor pays 80,000 toman (10,000*l.*) to the Shah for an appointment, of which he may be deprived any day, it can scarcely be expected of Oriental, or indeed of any human nature, that he will not make a good thing of it while he has it, and squeeze all he can out of the people." This system of buying and selling all official posts, from the highest to the lowest, is the radical cause of Persian misgovernment. The first part of the journey from Kirmanshab to Tehran lay along the ordinary caravan route, but it was undertaken at a time of year when Persians do not travel if they can help it, and the cold experienced was intense. At Nanej she took a route very rarely traversed by native caravans, and never to our knowledge by Europeans, making a short cut across to Kium, crossing the watershed which divides the river-system of Western Persia. Here the snow lay thick, and the difficulty of progression was great.

The authoress's account of Kium and the journey to Tehran is full of interest, as is her account of Tehran and her interview with the Shah, but in a book dealing so much with new ground and "unbeaten tracks" these chapters lose by comparison with the adventurous journey described in the latter part of the first and second volume. The journey to Ispahan was by the ordinary route, and gives an attractive description of this ancient city and its surroundings. The Armenians of Julfa and their habits and customs are fully described. Mrs. Bishop thinks that Mr. Curzon's description of Julfa is too uncomplimentary. Six months' sojourn there convinced the writer that it is preferable as a place of residence to any other place in Persia.

On April 30th, 1890, Mrs. Bishop started on her remarkable journey through the country of the Bakhtiari and Luristan to Hamadan, and thence by Urmī to Lake Van, and on through the district rendered notorious by the outrage of the Kurds and the oppression of the Christian races of Armenia, to Erzeroun and Trebizond. A sufficiently remarkable journey it would have been for men experienced in dealing with Orientals. The first few days' marches were through the pleasant country between Ispahan and the Kuh-i-Sukhta, on the other side of which lies Ardol, the headquarters of the Ikkhāni of the Bakhtiari. At Bahāva Rukh Mrs. Bishop was, as everywhere, in great request as a doctor, and her great benevolence and usefulness in this capacity endeared her to these wild people and no doubt protected her from violence and outrage. All will be glad to read Mrs. Bishop's evidence as to the desire felt by the Bakhtiari Khans for a prosperous trade-route through the country, and will feel with her what a regrettable fact it is that Persian jealousy has prevented this country being opened up to foreign commerce. Mrs. Bishop's account of her difficult and hazardous journey over these mountains, which form such a barrier to communication and trade in the regions, will interest all her readers. On the eastern side of the Gokun Pass, the travellers found themselves among the Chahar Lang Bakhtiari, a people very hostile to the Haft Lang Bakhtiari, by some of whom, as guides, Mrs. Bishop was attended. Endless dangers and difficulties were met with, and the marvel is that she escaped with her life.

Three and a half months after leaving Ispahan the authoress found herself at Burujird, a prosperous and thriving town in a very fertile neighbourhood, about half-way between Shuater and Tehran on the main-road between those towns. A week's march from here brought Mrs. Bishop to Hamadan, where she rested for four weeks with the hospitable American missionaries before proceeding on her arduous journey to Trebizond by way of Urmī and Van.

The authoress's account of Persian Kurdistan is fresh and novel. Sujbulak, the centre of the Persian fur trade, was visited, and seems to be a more important place, from a commercial point of view, than has been hitherto supposed. On October 8th, Mrs. Bishop reached Urmī, and her account of the "Dead

Sea of Urumiya" is well worth transcribing:—"Dead indeed it looked from that point of view (the Zibar Hills), and dead were its surroundings. It lay, a sheet of blue, bluer even than the heavens above it, stretching northward beyond the limits of vision, and bounded on the east, but very far away, by low blue ranges, seen faintly through a blue veil. On the west side there were mountains which recede considerably, and descend upon it in low rounded slopes or downs, over which the track, keeping near the water, lies. There was not a green thing, not a bush, or house, or flock of sheep, or horseman, or foot passenger along the miles of road which were visible from that point. The water lay in the macking beauty of its brilliant colouring, a sea without a shore, without a boat, without a ripple or flash of foam, lifeless utterly, dead from all past time or all time to come."

Space forbids that we should dwell on Mrs. Bishop's very interesting and exhaustive chapter on Armenian Christianity in Urmi. From Erzeroum to Trebizond, Mrs. Bishop met with terrible hardships. It was the month of December, and violent snowstorms and hurricanes of wind impeded the march. On the 12th the travellers came in sight of the Black Sea, and reached Trebizond, the end of her long and arduous ride.—[J. A. D.]

Zalesky, St. Szc.—*Ozero Ingol. Lake Ingol. Medico-topographical and Chemical Researches.* Tomsk, 1891-92: pp. xiii. and 91, with 2 maps and 8 plates.

In his preface the author, a professor of chemistry at the University of Tomsk, speaks of his pamphlet as a first attempt to treat in a strictly scientific and systematic way one of the most abundant of the mineral resources of Siberia. Lake Ingol, in the district of Achinsk, Government of Yeniseisk, on the very border of that and the Government of Tomsk, was so little known that the only map on which it could be found was a recent one of Yeniseisk, published in 1889. The lake lies between lat. 56° and 57° N. and long. 58° and 59° E. of Pulkovo, and is reached from Tomsk by road, the distance being 350 versts, or 230 miles. Although known to Russians for the healing properties of its water and mud-baths for the last thirty or forty years, it has only become famous quite recently. At the present time it enjoys a great reputation among Siberians who visit it in the summer months—June to September.—[E. D. M.]

AFRICA.

[Africa.]—*The Story of Africa and its Explorers.* Part. I. London, Cassell & Co. [1892]: 4to. Price 7d. [Presented by the Publishers.]

This is the first part of a popular illustrated work on Africa and African explorations, by Dr. Robert Brown, to be issued in monthly parts. The present part is accompanied by a large map of Africa (printed in colours), showing the routes of the principal explorers, and European Possessions and Spheres of Influence.

Barth, Henry.—*Travels and Discoveries in North and Central Africa.* London, &c., Ward, Lock, & Co., 1890: 12mo, pp. xvii. and 548, illustrations. Price 2s. [Presented by the Publishers.]

This volume (No. 20 of the Minerva Library) forms the second half of Barth's 'Travels in Northern and Central Africa,' thus completing the work. The first half was noticed in the 'Proceedings' for 1890, at p. 572. The present volume includes accounts of Timbúktu, Sókoto, and the basins of the Niger and Bénoué, covering the period between the years 1852 and 1855.

Binger [Capitaine —].—*Du Niger au Golfe de Guinée par le Pays de Kong et Le Moui* (1887-89). 2 vols. Paris, Hachette et Cie., 1892: 8vo, pp. 513 and 416, illustrations and maps. Price 25s.

The general outlines of this important journey have already been given in these 'Proceedings' (1890, pp. 166-168). By this exploration of the countries south of the Niger, another of the few blank portions remaining on the map of Africa disappears, and although the hypothetical Kong Mountains, which hitherto have found place on our maps, do not exist, yet Captain Binger's discoveries are remarkable and of the greatest importance for the geography, ethnology, and natural history of the countries through which he passed.

The chief geographical results are the determination of the river systems and watersheds of the eastern tributaries of the Upper Niger; and of the Volta, Comoe, Lahu, and other rivers which flow in a more or less southerly direction to the Gulf of Guinea. Based upon the previous information of Mungo Park, Caillié, and other travellers, we have hitherto assumed that the river system of the Upper Niger extended far to the south, where its chief tributaries had their sources in the mountain range of Kong, supposed to stretch from west to east between 6° and 9° N. lat., in which case the Volta and Comoe could be only unimportant coast rivers. The author has proved that this notion was an entirely erroneous one. Of all the tributaries of the Niger only one, the great Baze, extends as far down as between 7° and 8° N. lat., whilst immediately east of it most of the rivers flow to the Comoe or to the Volta, both of which have their sources much more to the north (about 11° N. lat.), thus forming mighty rivers which drain the greater part of the hitherto unknown territories south of the Niger. Instead of the high mountains of Kong, the author found only ranges of mountains of no considerable altitude, and widely extending tablelands from which rise, here and there, the characteristic African granite peaks. The highest elevations observed were less than 6000 feet above sea-level. The most prominent mountainous district is situated east of the Baze, and is called by the author Natinian-Sikasso. It is described as a series of plateaus and hills, consisting of sandstone and clay, and rising to a maximum height of about 1300 feet above the surrounding territory.

As regards the other geological features of the country, ferruginous rocks and conglomerates, schists, sandstones, and granite, and occasionally quartz and limestone, form the constituents of the soil, the formations being probably analogous to those which are met with in the countries west of the Niger. Perhaps the most important feature in connection with the geology of these regions is the gold which is found in considerable quantities. To the east of Signiri at Samaya, Siluba and Seku, not far from the Upper Niger, gold is obtained by the washing process. But still further in the interior of the country the precious metal occurs at many places: Lobi, Gurnosi, Buna, Buale, and Nienigue are described as gold-producing districts to the east of Kong, and in the latter country itself, not far from the capital of Kong, the author found gold-mines near Samata. In many of these localities, e.g. near the Upper Black Volta, the natives treat the auriferous soil by the rudest and most primitive washing processes, and yet the output of gold is not inconsiderable. The author met with still richer gold-fields on his way to the coast, when following the course of the Comoe river. He describes the whole basin of this river, and more especially the middle part of it, as being rich in gold deposits, and gold-washing is frequently practised by the natives, and proves very remunerative. Binger says that in several districts he did not find a single native who was not possessed of a quantity of gold, and he is inclined to think that in no country of the world more gold is found among natives than here. Here, as is the case more in the interior, all the gold is obtained by the simplest methods, and the author has no doubt that with modern apparatus and experienced workers, the quantities produced would be about five or six times as large. Captain Binger's statements seem to be free of exaggeration, and if he is correct, it is not impossible that the Gold Coast in the future may do more justice to its name than is the case at present.

The flora and fauna differ considerably in the different parts of the territories through which the author passed. As regards the former, three regions are distinguishable, of which the first comprises the countries north of the 11° of N. lat. Millet and sorghum are chiefly cultivated, and occasionally also rice and Indian corn are met with, and *Bassia* trees grow in abundance. *Daobabs* are found in the western districts, but more to the east they become very scarce. The second region, south of the 11° , is characterised by the appearance of numerous bulbous plants, some of which are largely cultivated. Fruit-trees become more frequent than in the more northern territories, banana and orange trees being occasionally met with among them. The third region, that of the *Elai guineensis*, reaches from about $8^{\circ} 30'$ N. lat. to the coast, and is characterised

by dense forests, and the full richness of tropical vegetation, cereals and *Dassia* trees being here of subordinate importance. Kola nuts grow in abundance between 6° and 7° 30' N. lat., and form one of the chief trade articles of Kong, Sakhal, Tengrela, and many other places. Indigo is only met with at intervals, but forms an important article in the industry of Kong. Tobacco seems to be indigenous to the Sudau, about thirty varieties being found, some of which are very good.

Most of the animals peculiar to Africa are found in these parts of the western Soudan, including all sorts of beasts of prey, many monkey species, two varieties of elephants, seven or eight of buffaloes, and at least twenty species of antelopes. The natives of different districts breed horses, donkeys, cattle, sheep, and other animals.

With regard to the inhabitants of these countries, the first to be mentioned are the Mande, who have gradually extended themselves over the whole territory from the west coast to about 2° W. long., and in some districts still further eastward, leaving only a comparatively small belt of the southern coast regions to other nations. Among the Mande and in their neighbourhood various other tribes have settled who differ from the Mande in appearance and language, viz.:—the Fulbe, Siene-re, Samokho, Mboing, Komono, Dokhesie, Tiofo, Hoho, Gurunga, Mossi, &c., the most interesting of whom are the light-coloured Fulbe. Without attempting to explain the mysterious origin of this particular nation, the author points out that they were known to exist in West Africa as far back as the fourth century of the Christian era, and probably in early times they formed two divisions, the eastern of which penetrated in the course of centuries into Sabarima, Haussa, Bornu, and even into Adamaua, Gurina, and Bussangai, founding the empire of Sokoto, and spreading westward towards Libtako and Djilgodi; whilst the other division (partly mixed with Tuaregs) migrated into the countries west of the Niger, occupying Ghannta, Djenne, Macina, Timbuktu, &c., and from there gradually advancing south and east. The author found that at the present time this portion of the Fulbe has passed the 10th degree N. lat., but their progress towards the south and east seems to be checked by the Mande, whom Binger regards as more active and energetic. All the Fulbe and many of the Mande are Mahomedans. It is impossible to say what has become of the Aborigines who inhabited the country before these immigrations took place, probably some of the before-named tribes who live among the Mande are their descendants, but in the face of definite ancient reports we doubt whether the author is correct in supposing that in antiquity this part of Africa was only very sparsely inhabited. It must be added that more towards the coast Gonja, Agni, Ashanti, and various other tribes are found who are not unknown to Europeans. In this native population all degrees are represented from the very lowest type of savages, such as the Komono, to the highly intelligent and semi-civilised inhabitants of Kong and other trading places.

Numerous trade routes cross these territories in various directions, the centre of all the native trade south of the Niger being the town of Kong, with a population of about 15,000 inhabitants, chiefly Mande. The leading articles of commerce are salt, gold, kola-nuts, and textiles.

The results of this journey are of the highest scientific value, and since the publication of Barth's great work, this account of Captain Binger's explorations is one of the most important contributions to the geography of West Africa.

—[H. S.]

AMERICA.

[America, United States].—Department of the Interior, United States Geological Survey, J. W. Powell, Director. *Bulletins of the United States Geological Survey*. Nos. 62, 65, 67—81. Washington, Government Printing Office, 1890—1891: 8vo., maps and illustrations. [Presented by the Director of the Survey.]

No. 72. *Altitudes between Lake Superior and the Rocky Mountains*, by Warren Upham. No. 76. *A Dictionary of Altitudes in the United States* (2nd edition), compiled by Henry Gannett. The remaining Nos. are mainly of geological interest.

Whymper, Edward.—*Travels amongst the Great Andes of the Equator.* London, John Murray, 1892: 8vo, pp. xxiv. and 456. Price 21s.—Supplementary Appendix, with contributions by H. W. Bates, F.R.S., Peter Cameron, A. E. Eaton, M.A., Martin Jacobs, O. Salvin, F.R.S., T. G. Bonney, D.Sc., F.R.S., F. Day, C.I.E., F.L.S., F. D. Goldman, F.R.S., E. J. Miers, F.L.S., David Sharp, M.D., F.R.S., G. A. Boulenger, W. L. Distant, H. S. Gorham, F.R.S., A. Sidney Olliff, T. R. R. Stebbing, M.A. 8vo, pp. xxii. and 147. Price 16s. [Presented by the Author.]

A hasty observer taking up the first of Mr. Whymper's volumes may possibly, after glancing at one or two illustrations, be led to fancy that he has to deal with nothing more serious than an unusually well illustrated book of popular travel. But the critic, if he chanced to know anything either of wood-cutting or natural history, will soon see that many of the woodcuts are very unusual indeed, that delicacy can hardly be carried farther, that the most consummate accuracy in minute detail is arrived at, and that the naturalist is considered as much as the artist. He will look with the admiration that the labour spent on it deserves on such a plate as that representing the insect life of a room in Guayaquil, as well as on the more imposing features of the glaciers and precipices of Antisana and Chimborazo. When he turns to the text he will find a narrative of a style to which the public is little used, marked by a suppression of all immaterial detail, and a combination of picturesque force with matterly reserve.

These volumes, the fruit of eleven years' hard work, are throughout a condensation of careful and laborious observations on the spot and subsequent study and reflection. In their pages facts, figures and arguments are set with curious skill in a framework of travel and adventure. A vivid picture is given of the Ecuadorian landscape and people. A vivid picture, indeed; but what a gloomy one: what a shock to popular conceptions of the Equatorial zone! We read of a region of natural repulsiveness; bleak misty uplands, sodden by incessant rains, vast broad-based mountains capped by glaciers on which the sun seldom shines, of a complete absence of the picturesque accidents of hill and valley, of spur and ravine, of lake and forest, of torrent and waterfall, that give their charm to our European ranges. We are introduced to a people never braced into energy by winter frosts, or burnt into passion by summer heats; a land where it is always a wet afternoon, a life stagnant, cheerless, squalid; for high roads rotten mule-tracks strewn with the skulls and skeletons of the unburied dead who have perished in some civil combat. The mountaineer has to contend not only with depressing conditions of atmosphere, but with all the difficulties of bad weather on the heights. From no summit was a clear view obtained by the climbers, though the Pacific was visible from over 18,000 feet on Chimborazo. Such a climate is naturally trying to the explorer. Mr. Whymper, after his first visit to the mountain, was carried into the nearest town in a litter, and he was subsequently laid up for several weeks. His companion, Louis Carrel, by his own carelessness it is true, got himself badly frostbitten on Chimborazo.

Mr. Whymper has already in these pages given a summary of his travels and ascents. We shall not attempt to recapitulate them. In the present volumes the personal narrative is secondary to the mass of information collected, digested, and set forth. The attempt to remit science to appendices has failed, if it was made. Observation throughout overflows incident; stirring as such incidents as the first ascent of Chimborazo, the night on the edge of the crater of Cotopaxi at 19,600 feet, and the ascent in a thunderstorm of Incahuatza by so competent a writer cannot fail to be. Mr. Whymper has not only his own observations to record, he is also eminent as a critic; he has the patience and skill needful to disentangle the threads of his predecessors' narratives. The results are occasionally surprising. It is only too clear that some eminent travellers in Ecuador, if they did not get above the snow-level, ventured considerably beyond the truth-level!

To tabulate briefly the results given in these volumes is not a simple matter. In the first place, our conception of the conformation of Ecuador, of the relation

of its ranges, is materially corrected and enlarged. The great mountains are shown to be independent 'massifs,' all of volcanic origin, set along or close to an axis of long prior upheaval. They are very extensively glaciated, contrary to the assertions of early travellers, who like some men of science even to-day did not know a glacier when they saw one! Possibly the failure of Humboldt and others to recognize the Ecuadorian glaciers was owing to the absence of torrents issuing from them. Much of the drainage of the district appears to be subterranean. "The two parallel Cordilleras, which according to geographers are the great features of the country, do not exist." There is no great valley in the interior of Ecuador. A coast range, hitherto unnoticed, separates Chimboraço from the ocean: Chimboraço itself belongs probably to the class of volcanoes that have been long extinct; the present safety valves of the region are Cotopaxi and Sangai.

A route-map on a scale of 8 miles to the inch, the result of the traveller's own observations with a transit theodolite, extending over a distance of over 250 miles, and fixing the positions of all the great volcanoes, accompanies the volume. To this are added detailed surveys of the glaciers of Chimboraço.

Contributions are made to various branches of natural science, particularly botany, zoology, and entomology. Large collections were brought home, the exact locality from which each specimen came being precisely noted, and the results carefully tabulated. Thus we find zoological and botanical "highest point" tables. A separate volume is devoted to the scientific description of the insects collected at great altitudes. The woodcuts in this are of wonderful delicacy and beauty, while the descriptions are endorsed by the authority of Mr. H. W. Bates, who has contributed a preface, in which he points out the generalization to be drawn from the collection and its importance with regard to Darwin's theory that the animals and plants of colder zones crossed the tropics during a glacial period. The beetles of the Ecuadorian heights are not strangers belonging now to Arctic and temperate regions, they are allied to the natives of the lowlands close at hand. Hence some obstacle must be supposed surmountable to plants, but not to insects, at the time when the temperate genera occupied the equator.

On the structure and material of the mountains we have the deductions of Prof. Bonney from Mr. Whymper's specimens. The snow-level and suchlike points are minutely determined. Those geographers who define it "as the line above which snow never melts" may learn with surprise that the cliffs near the summit of Chimboraço are draped with iceicles 150 feet long.

A number of stone implements, pointing to a stone age, and a collection of curious ancient Indian pottery were also made. The latter would have been larger, but for the misbehaviour of the transport mules, one of the difficulties of Ecuadorian travel.

Passing by other local observations, we must call attention to Mr. Whymper's very careful and detailed investigations in two matters of world-wide interest: the behaviour and shortcomings of aneroid barometers and human bodies under low pressures. The separate treatise on the former has already been noticed here. The effect of the "rarity of the air" on the human body is a still more complicated and obscure problem. Mr. Whymper has, by prolonged and careful observation, scientifically proved, what all thoughtful mountaineers have long admitted, that with diminution of pressure goes a diminution of physical power. This is often scarcely perceptible to ordinary observation, as, for instance, where speed per mile is reduced in Mr. Whymper's case, from 11.4 minutes at Lillie Bridge to 11.58 minutes at Qu'ito, 10,000 feet over sea-level. He has made a more novel point by insinuating that low pressure affects the human frame in at least two distinct ways—by causing pressure on the internal organs from the expansion of the gases within the body, and also by the increased exertion required to inhale sufficient air to feed the lungs. The latter inconvenience is naturally felt most while the double strain of the lessened supply and the increased demand caused by climbing up-hill has to be met, and is to a great extent relieved by rest or descent.

The first cause is that which creates the most frequent inconvenience at any rate on ascents up to 16,000 feet: and the same individual may suffer

severely from it one week at 14,000 feet and escape the next at 18,000 feet, as it depends largely on the temporary state of the organs. With regard to the difficulties of respiration, Mr. Whymper (possibly owing to the date at which his pages went to press) has not been able to analyse M. Vallot's very interesting physiological experiments during his stay of three days on the top of Mont Blanc. M. Vallot writes (*'Annuaire du Club Alpin Français,'* 14ème vol.), "Three days' residence on the top of Mont Blanc (15,780 feet) sufficed to entirely modify the method of my breathing; the last day my pulmonary capacity had notably augmented, and measured 250 centilitres, the number of inspirations was 17 a minute in place of 14 in the plain. The depth of the inspirations had doubled, it had become 100 centilitres. Thus the air being twice less dense than in the plain there entered twice as much into the lungs, and the equilibrium was thus established. I felt no more symptoms of mountain sickness." M. Junassen, in 1869, added nothing to these remarkable experiences, and he may consider himself lucky that he has escaped Mr. Whymper's notice. Otherwise, a philosopher who conceives that the only way to retain the full use of your faculties, mental and bodily, at 16,000 feet, is to be dragged up in a sledge, and maintains this in the face of the work done by Asiatic surveyors at great elevations, might have had his divagations severely handled. The rougher experiences of the men employed last year in tunnelling on the top of the mountain, led them to a conclusion identical with De Saussure, that they did one-third less work in the same time than at ordinary levels. It appears tolerably certain (as doctors acquainted with the action of pressure at Alpine health resorts, such as Davos, on the respiratory organs would expect) that the lungs adapt themselves rapidly to new conditions, and the limits of their power of adaptation are what have now to be determined. Put practically, it has to be tested how high men can go who have camped for some time previously at or above 20,000 feet. One point we venture to thank Mr. Whymper has passed over. If the condition of the human being differs the condition of the mountains differs also. The effect of low pressures is modified or intensified by accidental atmospheric conditions. On the first ascent of Elbruz, 18,500 feet, six men were none of them consciously affected in the least by the rarity of the air. In the second ascent all the members of an equally competent party suffered more or less. The one day was very windy, the other apparently still. In the early ascents of Mont Blanc it is often the stagnation of the air on the Grand Plateau that is complained of. On Monte Rosa mountain sickness is very rare. It is true the last ascent is infinitely less exhausting to the lungs than that of Mont Blanc, owing to the nature of the ground. But this explanation is inadequate. We cannot but believe that mountains which project, like promontories, above the lowlands and up the slopes of which rush draughts of air from the plains will be found the best for the attainment of the highest possible elevations. But the subject ramifies in many directions, and we must not here be carried beyond the limits of a review into individual experiences and opinions. The Asiatic ranges are the proper field for the solution of the problem, and it is in some respects a misfortune that Mr. Whymper was dissuaded from visiting them, though we hope he may still find an opportunity to do so. It must also be remembered that the pressure diminishes in a decreasing ratio, as we ascend, and that the difference between 15,000 and 30,000 feet is very much less than that between the sea-level and 15,000 feet—roughly speaking, about half.

As a whole, this book is a singular example of what may be effected single-handed by a traveller who spares neither time, labour, nor cost, either in travel or in the record of its results. It would be unfair, however, to the general traveller to bid him to go and do likewise. Few men are born with the capacities as artist, critic and mountaineer, which are united in the author of "The Ascent of the Matterhorn." There are few travellers whose boots the public would care to buy up greedily after eleven years' delay; there are many for whose books they would willingly wait longer. But these never keep us waiting at all!—[D. W. F.]

AUSTRALASIA.

[**Australia, Western.**—Annual General Report for the year 1890, by Harry Page Woodward, F.O.S., F.R.G.S., Government Geologist. Perth, 1891: 8vo, pp. 53. [Presented by the Government Geologist.]

After the General Report of work done during the year 1890, a short sketch is given of the general features of the country between Geraldton and the De Grey river, followed by a general description of the Victoria, Murchison, Gascoyne, Ashburton, Fortescue, Roebourne, and De Grey Districts. Under the heading of Mineral Resources a description is given of the route traversed from Geraldton to the Nullagine. In the appendices will be found a report by the Government geologist on the country passed over between Albany and Perth, including the Stirling Range, Jerramungup, the Gordon and Pallinup rivers.

[**Australia.**—The Australian Handbook (incorporating New Zealand, Fiji, and New Guinea), Shippers' and Importers' Directory and Business Guide for 1892. London, &c., Gordon & Gotch, 1892: large 8vo, pp. 600, maps.

GENERAL.

Asensio, José Maria.—Cristoval Colon. Su vida, sus viajes, sus descubrimientos. Barcelona, 2 vols. 1891: 4to, pp. 1643. Price 37.

This great work very fittingly commemorates the celebration of the fourth centenary of the discovery of America, while it is not too much to say that it is an addition of permanent value to the literature of Europe. It is the most complete and, on the whole, the best life of Columbus that has yet been written. The present edition is "monumental," being illustrated with several coloured engravings from the works of the best Spanish artists, and with headpieces and vignettes. Every page has an ornamental border, with allegorical fancies, events in the great Admiral's life, tropical and ocean scenery tastefully designed. The whole work reflects the highest credit on the typographical art of Barcelona. But there is only one map. It shows the various tracks of the great Admiral across the Atlantic.

The accomplished author, Don José Maria Asensio, is Director of the Royal Academy of Belles Lettres at Seville. He has bestowed years of research and of thought on the composition of a work which will do credit to his country, and he has been rewarded with a large measure of success.

The Life of Columbus, by Asensio, is, without doubt, the most satisfactory and complete biography that has yet appeared. Perfect master of his subject, acquainted alike with the old chronicles and documents and the results of the latest researches, Asensio had the further advantage of writing at Seville—within a stone's throw of the "Biblioteca Colombina." In a pleasantly written narrative he describes the events of the Admiral's life in full detail, discusses the points in dispute with critical insight and sagacity, and corrects several misconceptions of his predecessors. On the other hand, he has adopted an untenable date for the birth of Columbus, preferring a guess of Dr. Bernaldez to the repeated statements of the Admiral himself; and he has reverted to the exploded theory that Cat Island was his landfall. He, however, furnishes an antidote to the latter mistake, by printing among the notes and illustrations which conclude each division of his work an admirably argued memoir on the true landfall by Don Juan Ignacio de Armas, of Cuba.

These comparatively unimportant errors are more than compensated for by the good sense and sound judgment with which all the various difficulties connected with the Admiral's life are approached and discussed. Asensio, while far from blind to the weaknesses and blemishes in the character of Columbus, fully appreciates his genius, his magnanimity, and the amiable qualities which so endeared him to his friends and relations.

The value of this splendid edition is very much enhanced by the number of original documents that are printed at the end of each book. They include the texts of nearly the whole of the letters and reports contained in the work of Navarrete, besides many others, some of them being printed for the first

time. Such a wealth of documentary illustration necessarily swells the work to considerable dimensions. The two large volumes comprise 1643 pages of letterpress.—[C. R. M.]

[**'Challenger' Voyage.**—Report on the Scientific Results of the Voyage of H.M.S. *Challenger* during the years 1873-76, under the command of Captain George S. Nares, R.N., F.R.S., and the late Captain Frank Tourle Thomson, R.N. Prepared under the superintendence of the late Sir C. Wyville Thomson, KNT., F.R.S., &c. . . . and now of John Murray, LL.D., PH.D., &c., one of the Naturalists of the Expedition. Deep-sea Deposits. London, Eyre & Spottiswoode, 1891, 4to, pp. xxix. and 525. Price 42s. [Presented by the Lords of the Treasury.]

This is a further contribution to the scientific results of the voyage of the *Challenger*. It consists of a report on deep-sea deposits based on the specimens collected during the voyage of H.M.S. *Challenger* in the years 1872 to 1876, by John Murray and Rev. A. F. Renard, and adds greatly to our knowledge of the ocean. The volume is illustrated with 29 lithographic and chromolithographic plates, with explanations; 43 charts showing the distribution of marine deposits in colour, and the dredging and sounding stations; 22 diagrams showing the vertical distribution of temperature and the relations between the deposits and depth, and with 36 woodcuts in the text.

[**Ice and Snow.**—Beiträge zur Geographie des festen Wassers. Wissenschaftliche Veröffentlichungen des Vereins für Erdkunde zu Leipzig. I. Band, mit zwei Karten. Leipzig, Duncker & Humblot, 1891: 8vo, pp. vi. and 313.

This is a collection of articles by various authors upon the geographical distribution, causes, and effects of ice and snow. The most interesting are two essays of Dr. M. Friederich and Dr. G. Hartmann respectively, on ice and snow in the Polar regions. The former has compared the meteorological reports of the different polar expeditions, whilst the latter has investigated the influence of drift-ice on the configuration of the land in the polar regions, arriving at the conclusion that the formation of arctic islands, peninsulas, &c., is partly due to the motion of the drift-ice; the light specific gravity and the firmness of this ice being the principal features in its importance as a transporting agent.

Zapiski Kievs'kago obshchestva yestestvo-ispytatelei. Memoirs of the Kief Society of Naturalists. Kief, 1890-91.

Vol. x. parts 3 and 4. Contents: Review of the plants belonging to the flora of the Governments of Kief, Volhynia, Podolia, Chernigof, and Poltava. Continuation and end.—V. Montresor.

Vol. xi. part 1. Contents: Protocols of general meetings in 1889. Materials for the flora of the freshwater algae in Siberia, Art. II., with plate—M. Kozlovsky. Materials for the flora of the south-western part of the Government of Kherson—J. Pachosky. New facts on the influence of forests on climate, with plate—M. Kudrinsky. Crystallographical note, with four illustrations—V. Tarasenko. On the influence of light on the breathing process of plants, with plate—M. Parivitch.

Vol. xi. part 2. Contents: Botanical excursions in trans-Caspia; Researches in the Northern Caucasus (1889-90)—V. Lipetsky. The granite of Elizavetgrad—P. Merkulief. On some new plants from the environs of Kief—J. Schmalhausén. On the chalk formations of the Government of Podolia, with plate—J. Radkévitch. Materials for the fauna of the fresh-water mollusca of South-western Russia, with two plates—V. Lovinsky. Meteorological observations at the Seminary of Korostyshef in 1889; Tables of meteorological observations and temperatures of the soil—M. Kudrinsky.—[E. D. M.]

ENGLAND AND WALES: Lancashire. CX. N.E. Yorkshire. CXLV. N.E., CXXIV. N.E., S.E.
CXXIII. N.W., N.E., S.W., A.E. CXX. N.E., S.E., CXX. N.W., N.W., CXXI. S.E., CXXII. N.W., N.E.
CXXXVII. S.E., CXXXXIX. N.W., CXXII. N.W., CXXIII. N.E., CXXI. S.W., N.E., CXXI. S.W., S.E.,
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Town Plans—10-foot scale—

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General Map of England and Wales, showing County Boundaries, Railways, Rivers, Canals, Roads, and Principal Parks. Scale 6 statute miles to an inch. Complete in 16 sheets, 28 each.

(Stanford, Agent.)

ASIA.

Asia.—Carta semi-attuale dell'—, Italia e politica da Guido Cora. Scale 1 : 17,000,000 or 233 geographical miles to an inch. Torino. G. B. Paravia. Price 1s. 6d. (Dulau.)

Central-Asien.—Übersichtskarte von K. J. Bogdanowitsch' Reiseroute in —, in den Jahren 1889 und 1890. Scale 1 : 7,500,000 or 102·6 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1892, Taf. 5. Gotha, Justus Perthes. [Presented by the Publisher.]

AFRICA.

Maroc.—Carte Spéciale du —, avec Notice Géographique. Scale 1 : 3,000,000 or 41·6 geographical miles to an inch. Par Ch. Lassaully, géographe. Paris, Challamel et Cie.

On the margin of this map the author gives statistics as to the military forces of Morocco, the state of its commerce and industries, and information with regard to climate, finance, &c.

AMERICA.

Honduras et du Salvador.—Carte Commerciale du —. Par F. Bianconi, Ingénieur-géographe. Scale 1 : 1,000,000 or 13·6 geographical miles to an inch. Publiée par la Librairie Chaix, Paris. Octobre 1891. Première Edition. Cartes Commerciales, 7me Série, No. 4. Price 3s. 6d. [Presented by the Publishers.]

In the compilation of this map the author has received assistance, so far as Honduras is concerned, from M. L. Gaubert, the Consul-General for that country in Paris. All routes, railways, and means of communication by steamboats are laid down, and the mineral and vegetable productions are given in red letters on the map in the several places where they exist. As usual with this series, the map is accompanied by letterpress, containing information as to the geography and commercial position of the Republics of Honduras and Salvador.

No. IV.—APRIL 1892.]

Rand, McNally & Co.—Pocket Maps and Shippers' Guides of Illinois (scale 1:445,000 or 6·9 geographical miles to an inch); Indian and Oklahoma Territories (scale 1:750,000 or 10·2 geographical miles to an inch); Mississippi (scale 1:1,500,000 or 20·4 geographical miles to an inch); Missouri (scale 1:1,000,000 or 13·6 geographical miles to an inch); Nebraska (scale 1:1,130,000 or 15·4 geographical miles to an inch); New Jersey (scale 1:545,000 or 7·4 geographical miles to an inch); Ohio (scale 1:830,000 or 11·4 geographical miles to an inch); Oregon (scale 1:1,020,000 or 13·9 geographical miles to an inch); Vermont (scale 1:1,180,000 or 16·1 geographical miles to an inch); Wyoming (scale 1:1,150,000 or 15·7 geographical miles to an inch). **Rand, McNally & Co., Chicago.** Price 1s. 2d. each. [Presented by the Publisher, through E. Stanford, Esq.]

These maps belong to an excellent series in course of publication by **Rand, McNally & Co.,** of Chicago and New York. By means of symbols attached to the names of places, a large amount of information is given that will be extremely useful to tourists or persons visiting the United States on business. With the assistance of the index which accompanies each map, the name of the express company doing business in the district, the position of the most convenient telegraph station, the nearest marving point of all local places, and other items of useful information are given. The maps are clearly drawn, printed on tough thin paper, and folded into a size convenient for the pocket. Particular care has evidently been taken to lay down the railways correctly, and the systems of surveying in sections is also shown.

Oceanica.—Carta semi-murale dell' —, fisica e politica da Guido (ura. 1:16,000,000 or 219 geographical miles to an inch. Torino, G. B. Paravia. (*Dufau.*)

CHARTS.

Admiralty.—Charts and Plans published by the Hydrographic Office, Admiralty, in January and February 1892.

No.		Inches.	
1191	m —	0·5	England, east coast:—Flamborough head to Hartlepool. 2s. 6d.
1668	{m =	5·8}	Mediterranean, Asia Minor:—Ports Boghazi and
	{m =	6·2}	Pasla. Port Eglylar. 2s. 6d.
1567	m =	3·6	Mediterranean, Algeria; Approaches to Bona. 2s. 6d.
2058	d =	0·75	North Atlantic route chart, showing variation curves for 1895. 2s. 6d.
1072	m =	0·54	Indian ocean, Seychelles group:—Mahé island and approaches. 2s. 6d.
1416	m =	6·0	Australia, south coast: Princess Royal harbour. 2s.
2924	m =	0·5	Australia, east coast:—Cape Grafton to Hope islands, with the adjacent barrier reefs. 2s. 6d.
2159	Firth of Clyde and Loch Fyne:—Plan added. Burnt isles.		
2343	San Domingo island:—New plan of port Santa Barbara.		
1414	Solomon islands:—Plan added. Sketch of lagoon harbours on the south-west coast of Malaita.		
1490	Sandwich Islands:—Plans added, Kapurekahu bay, Waimoa bay, Waimua bay, and Kawahine bay.		
1877	Sandwich islands:—Plan added, Keauhou bay.		

(*J. D. Potter, Agent.*)

CHARTS CANCELLED.

No.	Cancelled by.	No.
1191 Flamborough head to the Tees	New chart. Flamborough head to Hartlepool	1191
2619 Plan of entrance to Princess Royal harbour	New plan. Princess Royal harbour	1418
2351 Cape Tribulation to cape Flat-tery	New chart. Cape Grafton to Hope islands	2924
1116 } Upper waters of Yangtse Kiang, a to e } 5 sheets		

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

A to P Index Charts (16 sheets). 1411, England, west coast:—New Quay to Holyhead. 1170a, England, west coast:—Holyhead to Liverpool, western sheet. 2052, England, east coast:—Harwich approaches. 633, Ireland, east coast:—Harbours and anchorages. 2309, Norway, west coast:—Lekö to Donnasd. 1461, Italy, west coast:—Genoa. 1559, Mediterranean, Adriatic:—Ports and anchorages in Istria. 1671, Mediterranean, Archipelago:—Port Sigri. 2555, Mediterranean:—Port of Algier. 486, West Indies:—Jamaica and Pedro bank. 1639, Gulf of Mexico:—Coasts of Louisiana and Texas. 1803, South America, north coast:—Cabo do Norte to Maranhão. 2689, North America, west coast:—Haro and Rosario straits. 143, Red sea:—Jebel Teir to Perim island. 8e, Red sea:—sheet 5. 1424, India, east coast:—Binlipatam to Gopalpur. 842, Bay of Bengal:—Sayer islands and adjacent coast to Lankawi island. 1844, Borneo:—Labuan island. 2347, Japan:—Nipon, Kiusiu, and Sikok islands. 651, Japan:—Buzgo channel. 1670 a & b, Australia, east coast:—Moreton bay (2 sheets). 1350 Australia, east coast:—Cook harbour.

(J. D. Potter, Agent.)

Atlantique Nord.—Nouvelle Carte de l'—. Par S. A. S. Le Prince Albert 1^{er} de Monaco. Campagnes Scientifiques. Étude des Courants, Carte 1, Itinéraires du yacht "l'Hirondelle," dans l'Océan Atlantique Nord en 1885, 1886, 1887, 1888. With an explanatory pamphlet. [Presented by the Author.]

This chart contains the results of experiments, made with floats, with regard to the currents, in the years 1885, 1886, 1887, and 1888, by the yacht *Hirondelle* in the North Atlantic, during which time 1676 floats were launched, of which 226 were recovered. The work appears to have been carried out in a systematic and painstaking manner, the results being shown on the chart by red lines drawn in such a way as to distinguish one series of experiments from another.

In the accompanying pamphlet, explanations are given of the general scheme adopted for showing the drift of the floats; they are, however, somewhat involved, and do not describe the system as clearly as could be desired. In addition to the letterpress, the results of the experiments are given in tabulated form.

ATLASES.

Hartleben, A.—Volks-Atlas, enthaltend 72 Karten in Einbundert Kartenseiten, mit vollständigen Register. Wien, Pest, u. Leipzig. A. Hartleben's Verlag. Zweite Ausgabe. 1. Lieferung. Price 6d. (Williams & Norgate.)

The first edition of this atlas was favourably noticed in the 'R. G. S. Proceedings,' June 1888. The present issue contains four sheets of maps, all of which are most creditable specimens of cartography. Considering the style in which the maps are produced, and the scales on which they are drawn, the price of each issue (sixpence) is astonishingly low, the more so as each map is

complete in itself, the paper only being printed on one side. This atlas will be completed in twenty fortnightly issues, and will contain one hundred pages of maps, and a full index.

Schweiz.—Topographischer Atlas der —, im Maasstab der Original-Aufnahmen nach dem Bundesgesetze vom 18. Dezember 1868 durch das eidg. topogr. Bureau, gemäss den Direktionen von Oberst Siegfried veröffentlicht. Scales 1 : 25,000 or 2·9 inches to a geographical mile, and 1 : 50,000 or 1·4 inches to a geographical mile. XXXVIII. Lieferung: Nr. 265, Schilsbach. 266, Spitzmellen. 270 bis, Soezthal. 287, Yvonand. 294, Donneloye. 384, Marbach. 385 bis, Schangnau. 421, Tarasp. 437, Morges. 439, Savigny. 456, Clardonne. 467, Villeneuve. XXXIX. Lieferung: Nr. 199, Ruswil. 201, Werthenstein. 307, Corcelles-le-Jorat. 327, Payerne. 351 bis, Gurnigel. 445, Nyon. 500, Sankt Niklaus. 539, Bogno. 540, Sessa. 540 bis, Agno. 541, Lugano. 542, Ponte Tresa. Price 12s. each part (containing 12 maps.) [Presented by the Bureau Topographique Fédéral à Berne.]

Stanford, E.—Handy Atlas of Modern Geography. 30 Coloured Maps and an Alphabetical List of Names, with their Latitudes and Longitudes. London, E. Stanford, 1892. Price 10s. 6d.

For purposes of general reference this is a handy atlas. The political divisions on the maps are however, in some instances, so heavily coloured, as to render the physical features very indistinct, and no special physical maps are given. "Modern" therefore must be taken in a political sense only. The alphabetical index with which the atlas is furnished will be useful as a gazetteer, but it must not be thought that all the names it contains are given on the maps, neither does it indicate the number of the map on which any place can be found, thus making a reference to the list at the beginning also necessary, in order to obtain the map required.

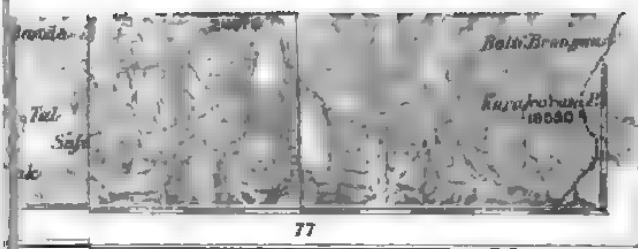
PHOTOGRAPHS.

Glazier, Lake.—Photograph of —, Mississippi River. Taken by Captain Willard Glazier, 1891. [Presented by Captain Willard Glazier.]

Mashonaland.—Album containing 150 Photographs of —. Taken by W. Ellerton Fry, 1890. [Presented by W. Ellerton Fry, Esq.]

This album is a valuable addition to the Society's collection. It contains a complete set of the photographs taken by Mr. W. Ellerton Fry during the time he was with the expedition engaged in the occupation of Mashonaland.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given. In response to this notice many valuable photographs have been presented; the collection, however, is at present far from being complete, one of its greatest deficiencies being the entire absence of any photographs of Asia Minor.



PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

The Ruins of Mashonaland, and Explorations in the Country.

By J. THEODORE BENT, Esq.

(Read at the Evening Meeting, February 22nd, 1892.)

Map and Plan, p. 352.

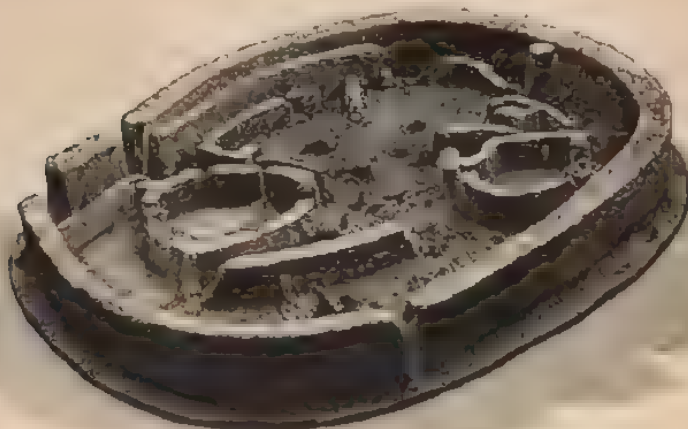
PART I.—THE RUINS.

Our primary object in visiting Mashonaland was to examine the Great Zimbabwe ruins; in addition to this, we kept in view the subsidiary objects of studying the manners and customs of the natives, and mapping out hitherto unvisited parts of the country. Our party consisted of my wife and myself, and Mr. Robert Swan, who acted as our cartographer, and to whom I am indebted for the plans and map which accompany this paper. It is unnecessary to enter into details concerning the weary journey up country, with its many delays and oft-recurring annoyances; the last 15 miles, from Fort Victoria to the ruins, took us seven days to accomplish, cutting a road, avoiding swamps, filling up game-pits, and making corduroy bridges. I will at once imagine that we have arrived at the Great Zimbabwe for our work on the 6th of June, 1891; our travels continued till towards the end of the year.

The ruins of the Great Zimbabwe, which name I have given to distinguish them from the numerous minor Zimbabwes scattered over the country, are situated in south latitude 20° 16' 30" and east longitude 31° 10' 10", at an elevation of 3300 feet above the sea-level. They form the principal of a long series of such ruins stretching up the whole length of the west side of the Sabi river, the southernmost which we visited being that on the Lundi, and the northernmost in the Mazoe valley. There are also many other ruins on the Limpopo, in the Transvaal, in Matabeleland, at Tati, the Impakwe and elsewhere, all of the same type and construction; but time would not permit of our visiting them. Some are equal to the ruins of Great Zimbabwe in workmanship, others again are very inferior, and point to the occupation of this

country having continued over a long period, probably centuries. Then all would seem to have been abandoned at one time in the face of some overwhelming calamity, for all the gateways at the Great Zimbabwe, and at Matindela, the second ruin in importance, 80 miles north-east of it as the crow flies, have been carefully walled up as for a siege; a forcible entry had been effected into the Great Zimbabwe by a gap in the weakest part of the large circular building. Doubtless at this capture of the fortresses a wholesale massacre of the inhabitants took place, and a complete destruction of the people and their objects of art. It is of course only speculative to consider the question of the race that destroyed these buildings; but in perusing the work of El Masoudi the Arab historian, who wrote in the tenth century, we find several interesting points concerning the descent of the Zenz tribes from Abyssinia, and their occupation of the gold country down to Sofala, a little before the period at which he wrote. One cannot help seeing many points which connect them with the present Abantu races: they were negroes, naked except for panther skins; they filed their teeth and were cannibals; they fought with long lances, and had ambuscades for

FIG. 1.



MODEL OF CIRCULAR RUIN.

game. They had no religion except that a sort of witch doctor occasionally addressed them, and bade them remember the prowess of their ancestors. They hunted for elephants, but never used for their own purposes the ivory or gold in which their country abounded. It is highly probable that these were the ancestors of the present Abantu races, and wrought the destruction of the older civilisation.

The Great Zimbabwe ruins cover a vast area of ground, and consist of the large circular building on a gentle rise with a network of inferior

Fig. 2.

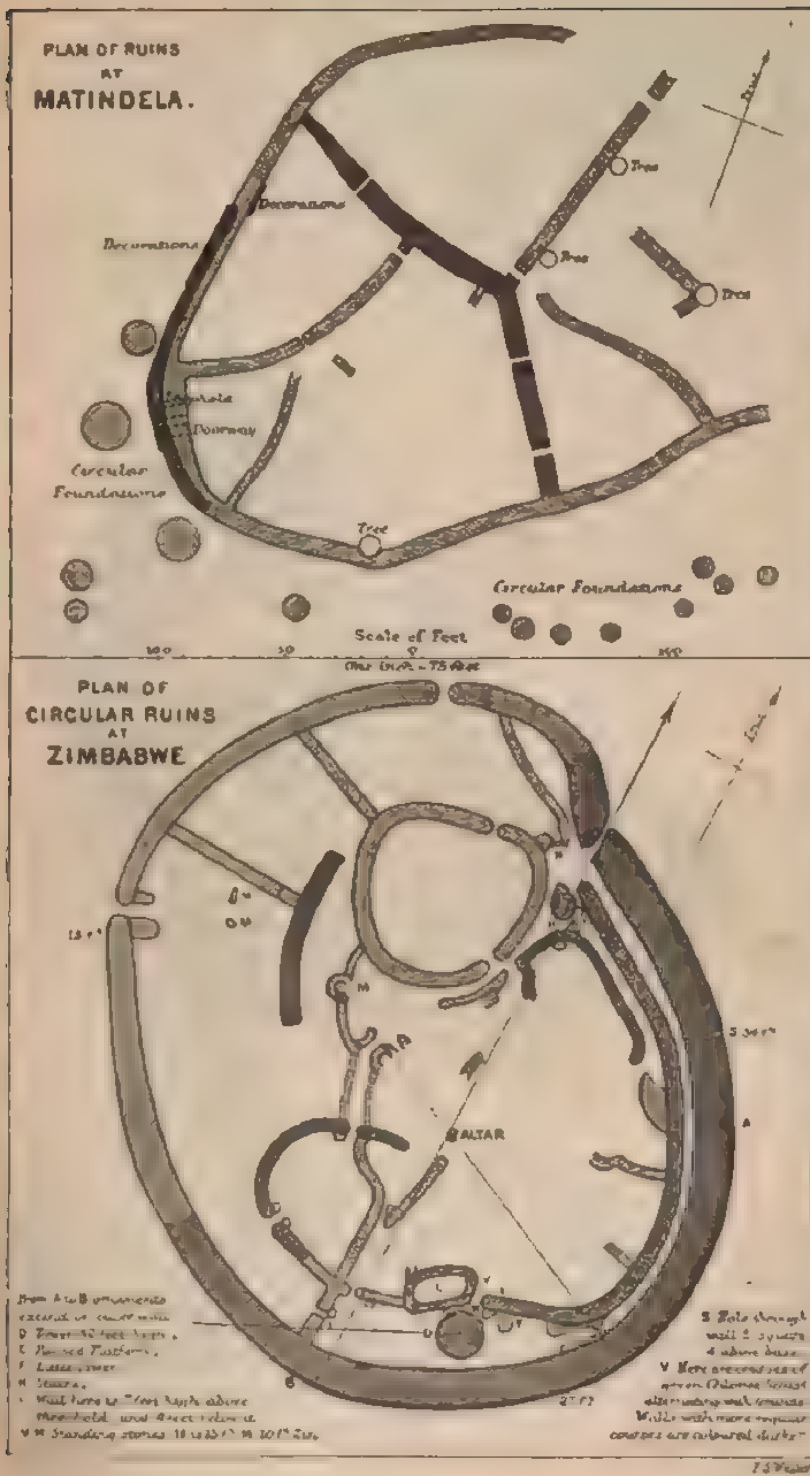


FIG. 3.



buildings extending into the valley below; and the labyrinthine fortresses on the hill, about 400 feet above, naturally protected by huge granite boulders and a precipice running round a considerable portion of it. From the plans and model, Figs. 1-3, a fair idea of the lower building can be obtained. It is built of small blocks of granite broken with the hammer into a uniform size, but bearing no trace of chisel-marks whatsoever, and no mortar had been used in the construction; in parts this encircling wall is 30 feet high and between 16 and 17 feet in thickness, and the courses of small stones are carried out with surprising regularity, arguing an accurate knowledge of levelling and an unlimited command of labour at a time when slave labour was abundant and time no object.

There are three entrances on the north side of the circle, carefully rounded off and protected on the inside with buttresses; that to the north, facing the fortress on the hill, would appear to have been the principal one, the small space inside being floored by strong reddish cement. Five passages led away from this entrance amongst the labyrinthine buildings inside. The one to the left went down some cement steps, and was carefully protected by a doorway consisting of two buttresses with apertures on either side to receive some form of door, which seems to have been universally employed in the buildings. These doors at the time of the siege had been removed, and their places supplied by walls carefully constructed of the same kind of stones as the outer walls. Then the left passage led into the long narrow passage, which conducted between high walls to the sacred enclosure.

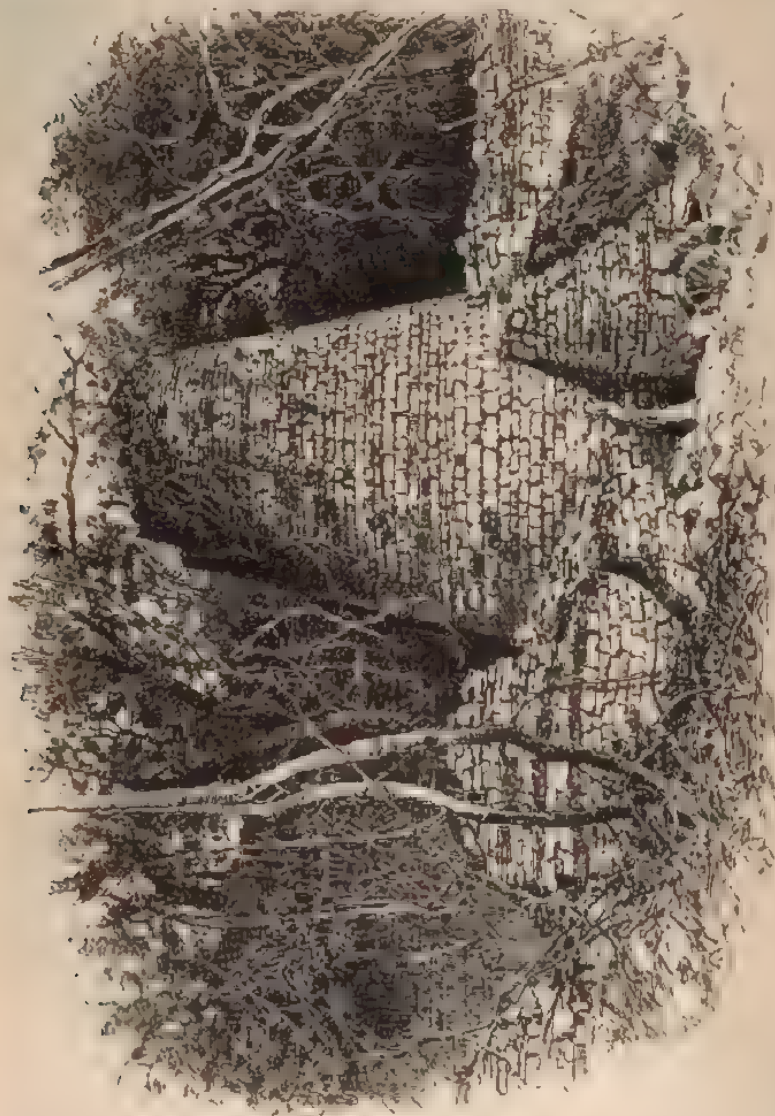
When we got to the Great Zimbabwe all the entrances were closed up. By climbing over fallen debris we reached the interior, only to find ourselves impeded by a maze of thick tropical vegetation which entirely concealed the ground-plan of the building, and which took us some days to clear away.

The above-mentioned long mysterious passage led, as I have said, to the sacred enclosure, where stand the two towers; the largest is now 32 feet high, Fig. 4, and had presumably several more courses. A few courses below the summit ran a pattern formed by the stones in one course being placed edgewise. This tower is really a wonderful structure, of perfect symmetry and with courses of unvarying regularity. By working underneath it and by extracting as many stones as we dared from two holes in the side, which we afterwards replaced, we satisfactorily demonstrated that it was solid. It was built on no other foundation but the hard clay of the place, and covered nothing: the foundations only go down about two feet below the present level, and one foot below a floor of cement which presumably covered this enclosure. It has been preserved to us simply by its solidity and the way in which the stones have supported one another. Its religious purport would seem to be conclusively proved by the numerous finds we made in

other parts of the ruins of a kindred nature, and a short quotation from Montfaucon's '*L'antiquité expliquée*' will explain its origin:—

"The ancients assure us that all the Arabians worshipped a tower which they call El Acara or Alquetila, which was built by their

FIG. 4.



THE NOTED TOWER IN THE CIRCULAR RUIN.

patriarch Ishmael. Maximus of Tyre says they honoured as a great god a great cut stone; this is apparently the same stone resembling Venus, according to Euthymius Zygabenus. When the Saracens were converted

to Christianity they were obliged to anathematise this stone which formerly they worshipped." This tower doubtless corresponded to the sacred tower of the Midianites called Penuei, or "the Face of God," which Gideon destroyed (Judges viii. 7). El Masoudi tells us that this stone or tower was eight cubits high, and was placed in an angle of the temple, which had no roof on.

That the ancient inhabitants of these ruins were given to the grosser forms of nature worship was self-evident from our finds. "The Arabians," says Herodotus, "of all the gods only worshipped Dionysus, whom they call Oureotai and Urania"; that is to say, they worshipped the two deities which, in the mind of the father of history, represented in themselves all that was then known of the mysteries of creation, and formed the basis of the belief of most of the primitive races of mankind.

Turning to Phœnician temple construction we have a good parallel to the ruins of the great Zimbabwe at Byblos; as depicted on the coins, the sacred cone is set up within the temple precincts. Similar work is also found in the round temples of the Cabiri in Malta, and the towers found in Sardinia may possibly be of similar significance. As to the little tower by the side of the larger one we felt authorised in almost demolishing it for scientific purposes, and found, as we expected, that it was entirely solid.

There are several points of interest connected with this sacred enclosure. The inner wall in front of the tower had been decorated with courses of black slate; a curious conduit about one foot square and regularly constructed runs right through the thickness of the outer wall at its thickest point. Similar and equally inexplicable conduits we found about the temple on the fortress. Then there is the raised platform approached by cement steps, and a gateway just in front of the tower, covered itself with a thick cement, into which a monolith had been stuck; this platform must have been for the king or officiating priest. The whole of the sacred enclosure had been most carefully protected by gates and buttresses. It is sunk a little lower than the rest of the building, and the outer wall is here at its strongest and thickest: it is moreover decorated on the outside with the pattern which stops abruptly at the place corresponding with the termination of the sacred enclosure in the interior, and the summit of the wall for this portion only had been decorated with large monoliths placed at equal intervals.

The rest of the enclosure would appear to have been occupied by private buildings also enclosed with circular walls, according, as Doughty tells, to the ancient Arabian custom of combining their temples and fortifications in one; and El Masoudi also tells us that most of the Sabæan temples were round.

The monoliths form a marked feature, two over 13 feet in height stand near the north-western entrance; a third lay prostrate a few

yards away. The summit of the walls, too, was interesting; it had been approached by steps from the principal entrance, was originally paved, and hence formed a fine broad promenade with that curious decoration of monoliths along it.

Externally the walls are very fine, and the courses, from their extreme evenness, give the building a neat and compact appearance. The pattern, which only decorates the part outside the long passage and the sacred enclosure, is in two rows let into the wall and formed by stones placed in a chevron pattern; it must have required considerable skill to execute as the building was proceeding. As will be seen from the plan, Fig. 2, the circle of the walls is by no means true, and the nature of the building is different. As I have already mentioned, the portion from the main entrance and round the sacred enclosure is higher, thicker, and more carefully built; the rest was either constructed at a later period or in a more careless manner; it is impossible now to walk on this portion of it, and it is rapidly falling into ruins. The middle entrance was evidently only a hole in the walls or sally port, probably of later construction, with wooden beams supporting the superincumbent structure, which have entirely given way. Our excavations in this circular building were not attended with success. It bore traces of Kaffir inhabitants up to within a recent date, and they had evidently cleared out all traces of an earlier occupation; in some kitchen middens outside we came across traces of minor importance.

Karl Mauch, the German traveller who visited these ruins thirty years ago, gives us a traditional account of a feast and sacrifice which took place here every two or three years. That it is true we were happily able to verify from two sources. Firstly, similar customs prevail still amongst the inhabitants further north on the occasion of their great annual feasts in memory of their ancestors; and, secondly, in a cave on the hills we came across the skeleton of a goat tied to a mat, and the sacrificial knife by its side. The present inhabitants of the kraal above the ruins know nothing of such things, and have not been long established here. This accounts for the entire abandonment of the circular building to the growth of nature during the present generation. The constant change and consequent loss of traditions is a difficulty which confronts those who try to penetrate into the African history of the past. Men, villages, and things are all subject to this rapid change; tribes seldom stay more than one generation in one place; great chiefs disappear, and tribes get confounded one with another. Language, customs, and people are all changed by this influence; nothing is stable about them, nothing is fixed. What a Livingstone has related may be found to be false by a Stanley, and yet both may be correct. Hence I take native evidence as of absolutely no value in respect to the ruins at Zimbabwe.

As to the term Zimbabwe, it is of Kaffir and Abantu origin, and

further north, as we found for ourselves in our travels, it is in general use to denote the head kraal of any chief. M'toko has his Zimbabwe where the annual sacrifice to the spirit of his ancestors takes place; so has Makoni, so has Mangwendi, and so has a vassal chief Chipunza. Zi is the Abantu root for a village; umzi in Zulu is a collection of kraals; zimbab would signify somewhat the same, or rather "the great kraal"; and we is the terminal denoting an exclamation; so that Zimbabwe would mean "Here is the great kraal."

Early Portuguese travellers and writers have misled us not a little in this respect, and lead us to suppose that the Great Zimbabwe was first here and then there, whereas they are really referring to the kraals of the various chiefs. In point of fact there is no evidence to show that any Portuguese traveller ever saw the ruins. De Barros gives us an account of them, which must have been acquired from hearsay; though accurate on many points, he describes the fortress as square, whereas it is round, and the tower as being at the top of the hill, whereas it is at the bottom. His information was gained, as he himself states, "from the Arab traders who were there." He sums up his account with these words: "When and by whom these buildings were erected is unknown to the natives, who have no written characters. They merely say they are the work of the devil, because they are beyond their power to execute. Besides these there is to be found no other mason work, ancient or modern, in that region, seeing that all the dwellings of the barbarians are of wood and rushes."

Dos Santos is undoubtedly the most trustworthy of the Portuguese writers of that period. He writes only of those things that he saw, and his account of the natives might have been written to-day, so little have they altered in the general lines of their customs for 300 years. The kings' houses of those days were daubed with clay and covered with straw, and Dos Santos has a good laugh at those writers who persisted in telling fabulous stories of the country. One writer follows the other in telling lies and adding a little of his own; Couto, Leo Africanus, Dapper, Purchas, and a whole string of works I could name, all with falsehoods similar to those told by many modern travellers in the Dark Continent, and all leaving the student who tries to study the native at home in a hopeless state of confusion.

To return from this digression to our ruins and our work. Nothing much need be said about the ruins immediately adjoining the large circular building; the nearest one is joined to it by a long wall, and is a confused mass of chambers, with the foundations of what appear to have been two round towers on the highest level. It has three intricate entrances, one protected with an ambuscade and another approached by steps. The noticeable feature here is that the walls are squared and not rounded at the corners, and thus it compares with the ruin at Matindela and the fort near the Lundi, where all the entrances are similarly con-

structed, and point to a somewhat later date, when the courses were not so even and the stones more irregular in size. We found nothing in it except Kasfir remains. Sloping down to the hollow there is one continuous mass of ruins, circular buildings for the most part, all more or less connected with one another. Some appear to belong to the best period of workmanship, others are more carelessly constructed. Circular buildings are found all along the valley to the edge of the ravine, about half a mile away. A wall of rude construction, evidently hastily thrown together at a time of danger, runs for more than a mile down the opposite valley. This valley in former years, and the slopes leading up to the fortress, must have been entirely covered with buildings, and accommodated a large population.

The principal part of our work and our most interesting discoveries took place on the hill fortress, to which we will now proceed, and the labyrinthine nature of which can be seen from the accompanying plan, (Fig. 3). The *kopje* itself is of great natural strength, being protected on one side by gigantic granite boulders, and on the south by a precipice from 70 to 90 feet in height. On the only accessible side the inhabitants constructed a wall of massive thickness like those of the ruins below; it is 13 feet thick on the summit with a batter of one foot in six; it is 30 feet high in parts, and the flat causeway on the top was decorated on the outside edge by a succession of small round towers—seven in all we made out—about three feet in diameter, alternating with tall monoliths—a most peculiar and unique form of decoration.

To open out the approach to this fortress town was a work of considerable time and labour. It will easily be seen how intricate it is, protected at every turn with traverses and ambuscades; and then commences at the bottom of the precipice a flight of steps leading up. The architects have availed themselves of a narrow slit in the granite boulder, up which the steps led, the passage being exceedingly narrow. Then the path divided into two, one path turning abruptly to the right, and at the turning a pretty little bit of wall with the stones placed pointways for about a yard relieved the monotony. It next led along a narrow ledge over the precipice, and in spite of the impossibility of attack at such a point it is nevertheless protected by traverses even here. In fact the redundancy of fortification all over this mountain, the useless repetition of walls over a precipice itself inaccessible, the care with which every hole in the boulders through which an arrow could pass is closed, prove that the occupants were in constant dread of attack, and lived like a garrison in the heart of an enemy's country.

At the summit of the mountain are huge boulders about 50 feet high. Immediately below the highest is a curious little plateau which had been decorated by the ancient occupiers; it is approached by narrow passages and steps on either side and a curious passage through the wall



Averaging 5 feet in height.

BIRDS ON SOAPSTONE PEDESTALS.

below, covered with huge beams of granite to support the superincumbent weight. The steps on one side were made of the same strong cement, and the wall to the left was decorated with the same design of stones placed edgeways for six rows that we had at the angle of the approach. The little plateau itself was adorned with huge monoliths and decorated beams of soapstone, the patterns on which were chiefly of a geometric character; one was 13 feet in height. Here too we unearthed many crushing stones of diorite and a curious stone with lines carried round it with great regularity; another similar one we found in the temple itself.

The large semicircular space below this was a dense jungle when we started to work, consisting of nettles of extraordinary pricking powers and other obnoxious plants which our natives cleared away. Here again were evident signs of fairly recent Kaffir habitation, beneath which further relics may be found; but our time and resources would not permit us to conclude this work; however, Mr. Cecil Rhodes has kindly consented to have the work carried on, so there is every hope of further material coming to hand. The view from this spot is magnificent over the Livure and Beza mountains, and situated as it is far above the

level of the marshy ground it would be healthy and habitable during all seasons of the year.

Time will not now permit me to enter into details concerning all the intricacies of this fortress; its narrow gullies protected for no conceivable reason with walls and traverses; its huge granite boulders with every slit through which an arrow could pass carefully walled up; but a glance at the plan will show its chief points better than any description by words can give.

The corner of the fortress which yielded our principal finds is now used as a cattle kraal by



FIG. 6.

34 inches in height.

3 inches in height.

MINIATURE BIRDS.

the petty chief on the hill. This building was anciently the temple of the fortress, and was luckily not so much disturbed as the one below. The aspect was the same, namely south-east, and the outer decoration, the pointed or edgeways pattern, ran around the same portion of the building as on the round one below. This temple among the granite boulders was supported by a very elaborately constructed system of under walls filled up with large stones, on which the cement floor rested, as was the case in the raised platform below. The

temple was approached by a narrow passage and a staircase of considerable architectural merit, which we laid bare; the steps are formed by a continuation of the rounded courses of the outer walls, and have the effect of two miniature amphitheatres opposite to one another, which acted as stairways from the passage below to the level of the temple itself.

The outer wall of this temple was decorated with birds carved on the summit of soapstone beams five or six feet in height, Fig. 5. Of the six we have all are different and all archaic in design; only one is perfect, and from its beak we can easily see that it is intended to represent a vulture. Two have decorations down the back and round the neck, and one has four circles cut on it, two on the wings and two below, presumably to represent incubation and fertility. Egyptian archaeology teaches us something of the attributes anciently supposed to pertain to the vulture; amongst other things Horapollon tells us (i. ii.) that it was emblematic "of Urania, a year, or mother." Ælian goes so far as to suppose that all vultures were females to account for their character as emblems of maternity; this is a curious confirmation of the previously quoted statement of Herodotus. We have seen how the attributes of Dionysus were worshipped in the tower below, here we have Urania as the presiding deity. In the soil of the temple we found numerous soapstone objects corresponding to the Lingams of India, and a tiny bird on a pedestal, the miniature representative of the larger emblems, Fig. 6.

An altar stood in the centre of the temple on the cement floor, which unfortunately fell to pieces after the earth which supported it had been a short time removed. Supporting walls gradually led up in steps to the boulders, and of two gullies between these boulders at the back of the temple, one led to another enclosure with two huge monoliths in the centre, and a terrace above overlooking the temple, and the other led through into the native kraal on the other side of the wall of rock.

Adjoining the temple, and approached by a flight of steps, was a space shut in by boulders, and walled in with great care at the extremities. Two caves ran beneath the boulders, and in these we found most of our treasures.

Of these, the most attractive are the numerous fragments of soapstone bowls, perhaps used in temple service and when broken cast out hither. One represents a hunting scene, Fig. 9, in which a man, rather of a Hottentot type, with an arrow, is in pursuit of a herd of zebras; behind him he drags a dog with a leash, which has turned round to growl at two hippopotami. There is a bird too, rather rudely executed, but

FIG. 7.



FRAGMENT OF PROCESSION.

this is the character of all the bowls with figures on. The workmanship of the bowls themselves is excellent, and made with the chisel; geometric patterns also are executed with great care, but the figures are rather grotesque. Another bowl gives us a portion of a procession, Fig. 7; another is decorated with a row of bulls, Fig. 8; different animals and different patterns were found on all the fragments; no two fragments of the same bowl ever occurring. Several of the best finished

FIG. 8.



ON BOWL.

bowls were perfectly plain, notably one very large one, Fig. 10, which is almost intact, and has a very finely chiselled surface and well-rounded edges. There is one fragment on which I take it some letters are rudely scratched, resembling somewhat the Ogham characters or strokes on either side of a line to give them value. I have not yet found any one who can suggest any solution of this problem, and I should have felt inclined to consider it hopeless had not Mr. Anderson shown me a sketch of a stone from Bechuanaland taken thirty years ago, which has characters on it closely corresponding to these.

FIG. 9.

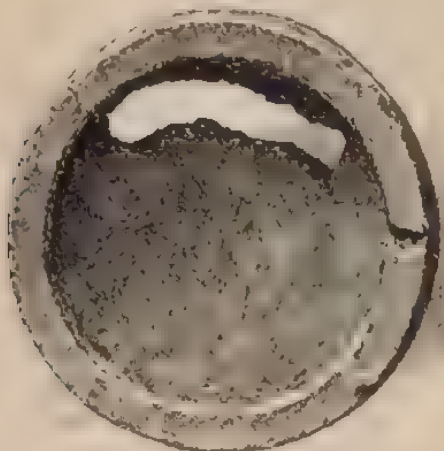


HUNTING SCENE.

Many fragments of pottery of excellent glaze and workmanship were also found; the patterns on these are mostly geometric but executed with absolute correctness with a stamp, and there appear to be wheel marks at the back. Of the numerous implements of war we found, many are doubtless Kaffir and of a later date. One, however, is an assegai with a heavy plating of gold on it which must belong to an earlier period; and the spear-head of copper heavily barbed corresponds to weapons now found amongst natives not at a great distance from

this spot. The iron bells, too, which we found in the ruins occur now on the Congo hundreds of miles away, but the uniformity of design all over Africa and the conservative nature of these designs makes it difficult to attach any date to them. Everywhere in the ruins we turned up circular whorls of pottery, some decorated and some plain, which at first we took to belong to spindles for cotton; but some are too small and could never have been used for that purpose. The

FIG. 10.



LARGE PLAIN BOWL 2 FT. 4 IN. DIAMETER.

circular soapstone object with knobs thereon, which was brought, together with the bird which I am able to show to-night, by a Dutchman from Zimbabwe two years ago, Mr. Trimmen, of the Cape Museum, has kindly lent for exhibition in England. The first impression it gives is that of a quern; but soft stone like this can never have been used for the purposes of grinding, and all objects of soapstone found in the ruins would appear to be for decorative purposes only.

In one corner of this same part of the fortress, near the surface, we found several fragments of Persian and Celadon china, doubtless used as barter goods by the Arab traders who came up from the coast, but nowhere during all our excavations could we come across any signs of coins or traces of a cemetery for the burial of their dead. It is a curious fact that in a paper which I previously had the honour of reading here on our excavations in the Bahrein Islands, I had to deal with a vast cemetery for which no satisfactory town could be found, and here we have a vast town without any sign of a cemetery near it.

Perhaps the most interesting of our finds in this portion of the ruins were those in connection with the manufacture of gold. Close underneath the temple stood a gold-smelting furnace, made of very hard

cement, with a chimney of the same material, and very neatly bevelled edges, portions of which are in my possession. Hard by, in a chasm between two boulders, lay all the rejected quartz casings from which the gold-bearing quartz had been extracted by exposing them to heat prior to the crushing; proving beyond a doubt that these ruins, though themselves far removed from any gold reef, are those of the capital of a gold-producing people, who had chosen this hill fortress with its granite boulders owing to its peculiar advantages for strategic purposes.

Near the furnace too we found many little crucibles of a composition of clay, which had been used for smelting the gold, and in nearly all of them exist small specks of gold adhering to the glaze formed by the heat of the process. There are tools also amongst our finds for extracting gold, burnishers, crushers, &c., and an ingot mould of soapstone of a curious form, which is still in use amongst the natives much further north for ingots of iron.

An interesting parallel to the ancient gold-workings in Mashonaland is to be found by studying the accounts of the ancient gold-workings of the Egyptian gold-mines in Wadi Allaga. The ancient Egyptians also extracted gold from quartz by means of crushing and washing, as we see from the process depicted in the paintings on the Egyptian tombs, and in any gold-producing quarter of Mashonaland, near old shafts and by the side of streams, innumerable crushing-stones are still to be seen, used formerly for a like purpose.

Diodorus tells us of the gangs of slaves employed in this arduous labour, and of the long dark shafts into which they descended. In the Muzoo district we entered several of these ancient shafts, and it is obvious here that not only for working the mines but for the construction of the massive buildings similar gangs of slaves were employed. After describing the process of crushing and washing Diodorus concludes, "They then put it into earthen crucibles well closed with clay, and leave it in a furnace for five successive days and nights, after which it is suffered to cool. The crucibles are then opened and nothing is found in them but the pure gold, a little diminished in quantity." Here we have an exact parallel to our clay crucibles at Zimbabwe. The heavy plating of metal with gold which was practised in Egypt was also known to the people of Zimbabwe, as the gilding on our spear-head demonstrates.

I will not discuss our finds now at greater length, but sum up a few of the leading points and the deductions to be made from them.

The first point that is obvious is that the ruins and the things in them are not in any way connected with any known African race; the objects of art and the special cult are foreign to the country altogether, where the only recognised form of religion is, and has been since the days when the early Portuguese explorers penetrated into it and El Masoudi wrote, that of ancestor worship.

The second point is also obvious, that the ruins formed a garrison for the protection of a gold-working race in remote antiquity. So we must look around for such a race outside the limits of Africa, and it is in Arabia that we find the object of our search. Arabia and her early commercial enterprises form a study but inaccurately known now. That the Red Sea was bristling with activity centuries prior to our epoch is an accepted fact; that Arab ships brought spices from India, the cassia tree from China, is also clearly proved, and all ancient authorities speak of Arabian gold in terms of extravagant praise. The Bible is full of allusions to this fact. From the sculptures at Thebes we learn that they paid tribute in golden ingots and rings; as also they did to Tiglath Pileser of Assyria in B.C. 733. Aristæus tells us "that a large quantity of spices, precious stones, and gold were brought to Rome by the Arabians," not from Arabia, but "by the Arabians," as carriers of such things from the outer seas. Travellers in Arabia, including Niebuhr, bear testimony to the fact that little, if any, gold came from Arabia itself, and here in Africa, much nearer to them than China, gold was produced in large quantities both from alluvial and from quartz, from the remotest ages. As I have already shown, a cult practised in Arabia in early times was also practised here; hence there is little room for doubt that the builders and workers of the Great Zimbabwe came from the Arabian peninsula.

When the Portuguese reached Sofala at the close of the 15th century the Arabs were still in possession of the coast, and though banished from the interior they obtained gold by trading with the natives. Persian and Chinese pottery have frequently been found on the coast, and also Chinese and other coins, pointing to the extent of their commercial enterprise; and from these Arabs the Portuguese elicited traditions of the past of more or less value, but all pointing in the same direction. The innumerable shafts sunk in the Mazoe, Hartley Hills, Umzweewe and Manica districts, the acres of alluvial turned over, point to vast enterprise incompatible with the character of the African native, and I have no hesitation in assigning this enterprise to Arabian origin, and to a pre-Mohammedan period; the ruins of Great Zimbabwe were closely connected with the *Thesauris Arabum et divitiis Indis* of antiquity.

It is impossible here to go into the elaborate arguments of the eminent Arabian scholar and decipherer of Himyaritic inscriptions, Herr Eduard Glaser. They are based on the Periplus of the Red Sea, Ptolemy, Pliny, and other geographers, and the Sabæo-Himyaritic inscriptions. After stating that the culture of the old Arabian kingdoms hangs together with those of Mesopotamia, Elam, Syria, and Egypt, he sums up his deductions as follows:—

"Be it as it may. So much is absolutely certain that Himyar (Arabia) then possessed almost the whole of East Africa. Such a
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possession, however, was not won in a night, but rather presupposes, in those old times without cannon and without powder, centuries of exertion."

Geographical annals also assist us in supporting the above statements, though apparently the Arabians, like their kinsmen of Phœnicia, were exceeding chary of informing the rest of the world of the whereabouts of their treasure. Yemen or Arabia Felix was conquered by the Egyptians under Hatasou in the 18th dynasty and from the illustrations of the booty depicted on the bas-reliefs of Deir el Bahari, the people of Punt are depicted as producing ebony, ostrich feathers, leopard skins, giraffes, lions, baboons, and elephant tusks, living leopards, and ingots of gold, products distinctly of African origin. It is incontrovertibly proved that Abyssinia (Æthiopia) was colonised from Arabia, and according to the *Periplus of the Red Sea* by an anonymous contemporary of Pliny, many parts of the African coast south of Abyssinia were under the suzerainty of the Arabians in the Sabæo-Himyaritic period. There were three cities of the name of Sabæ in the territories of this race mentioned by ancient geographers, two on the Arabian peninsula and one in Æthiopia; even now we have the great river Sabi flowing not so very far from the great Zimbabwe ruins and in close proximity to the line of forts at Matindola.

PART II.—EXPLORATION IN THE COUNTRY.

I now propose to give a short outline of our various wanderings in Mashonaland and a description of the people we were amongst after the conclusion of our work at Great Zimbabwe. First of all, however, I wish to enter a geographical protest against the name Mashonaland and Mashonas for the inhabitants. All the people and tribes around Great Zimbabwe, with whom we were intimately acquainted during our sojourn of several months amongst them; all the people down towards the Sabi, and north to Fort Charter—and this is the most populous part of the whole country—call themselves by one name, though they are divided into many tribes, and that name is Makalanga. In answer to questions as to nationality they call themselves Makalangas, in contradistinction to the Shangans on the other side of the Sabi. "You will find many Makalanga there," "A Makalanga is buried here," and so on. The race is exceedingly numerous, and certain British and Dutch pioneers, with their characteristic perverseness, have styled a race Makalaka, and imagine it to be a Zulu term of reproach for a limited number of people down by the Lundi. I contend that all the people from the Lundi to Fort Charter, at the very least, and east to the Sabi, call themselves Makalangas, and their land should be called Makalangaland. In this theory I am glad to find that I am ably supported by the Portuguese writer Father Dos Santos, who says, "The Monomatapa and all his

vassals are Mocarangas, a name which they have because they live in the land of Mocaranga, and talk the language called Mocaranga, which is the best and most polished of all Kaffir languages, which I have seen in this Ethiopia." Every one knows the Portuguese custom of substituting *r* for *l*. Umtali is called by them Umtare, and blanco branco, hence with this little Portuguese variant the names are identical. Father Torrend too, in his recent work on the Abantu languages, speaks of the Karanga branch as spoken by the people of Monomatapa and their descendants. Though I fear the name Mashonaland has got too firm a hold over the British mind ever to be altered, and to this I have bowed myself reluctantly in this paper, nevertheless I am convinced that Makalangaland is the correct designation for the country, and it is a very picturesque name too, being derived from the Abantu word *Langa*, the sun, *Ka*, of, and *Ma* or *Ba* the people of, and means "the people of the sun." Several tribes of Bakalanga came into Natal in 1720, forced down by Zulu hordes, with traditions of having once belonged to a powerful tribe further north. This tribe was exceedingly powerful at the first advent of the Portuguese, and was ruled over by a chief with the dynastic name of Monomatapa. Each tribe of the Makalangas of to-day is still ruled over by a chief with a dynastic name, and the succession to the numerous chiefdoms is still the same.

Father Dos Santos gives us an interesting account of the breaking up of this great tribe, breaking up as all African tribes do after a generation or two of power, like the Zulus under Cetewayo and many kindred instances. A Monomatapa sent three sons to govern in three provinces, Quitere, Sedanda, and Chicanga. On their father's death they refused to give up to the heir their respective territories, and the country was divided into four. Since then it has been subdivided again and again; each petty chief fights with his neighbour, union is impossible, and they fell an easy prey to the powerful Zulu organisation under Umzilikatze and his successor Lobengula. This I take to be, in a few words, the history of the country and its people during modern times, and as much probably as will ever be known of them.

Of all Portuguese writers, I repeat, Dos Santos is the most trustworthy. His details are charming, he describes the iron forges as we can see them to-day around Mount Wedza. He describes their beer, their houses, even their greetings with the clapping of hands, just as a traveller would describe them now.

On leaving the Great Zimbabwe, on August 3rd, 1891, we passed a few days in visiting some of the petty chiefs of the neighbourhood, and stayed in their huta. Then, joining our waggons again at Fort Victoria, we went with them as far as the Makori post station, where we left the main road and proceeded due eastwards towards the Sabi river with horses, donkeys, and tents. Our path led us through Gutu's country, one of the most influential of the Makalanga chiefs; his capital Gona is hid away amongst

fantastic granite kopjes, which here take the most extraordinary shapes and form quite a feature of the landscape. We passed many rivers of considerable volume, tributaries of the Sabi, and as we drew near the great stream the mountains appeared loftier, and vegetation more dense and rank; kopjes with huge baobab trees of immense girth blended weirdly with the granite boulders, and as we approached the Sabi the population, which had been very large through Gutu's country, grew scantier and scantier, the paths dwindled away and disappeared, and for many days near the river we had to make our way through the jungle, guided only by a knowledge of the direction in which we had to go.

Though we were told that in this district lions abound and that it would be constantly necessary to make large camp fires, I must candidly admit that we neither saw nor heard one, nor did we later during our wanderings in M'toko's country where the lion is worshipped and never killed, nor in any part of the high veldt; only down by the Pungwe river were we made conscious of the presence of the king of beasts. Naturally this experience has made us treat with scepticism the many lion stories which have come within our notice. There is still a fair amount of game in the Sabi valley, zebra, hartebeest and many kinds of antelope, but nothing to what previous accounts had led us to anticipate.

The line of ruins, to visit which was the primary object of this journey, commenced at a spot called Metemo, where a fort of poor workmanship crowns a gentle eminence with lovely views over the Sabi mountains. A little further on there is another called Chilonga, also of an inferior kind; but the chief fort of this district is called Matindela, the Makalanga word for guinea-fowl, which are very numerous hereabouts. The circular building at Matindela encloses an area not far short of that enclosed by the large circular building at the Great Zimbabwe; it crowns a low sloping granite kopje about 150 feet in height. The place is full of huge baobab trees, two of which in their growth have pushed down and grown up in the walls themselves. There are those that tell us about the fabulous age of the baobab, attributing an age of 5000 years to the larger ones. My friend Mr. Thiselton Dyer, of Kew Gardens, tells me that this is grossly exaggerated and that a few centuries is probably all that can be attributed to the very largest. Be this as it may the baobabs have grown up and arrived at maturity long after the building of Matindela fort and its subsequent abandonment.

The walls of Matindela are nowhere more than 15 feet in height, nor are the courses nearly as regular as those of the Great Zimbabwe, but the patterns therein are more elaborate. From what I have heard of the ruins at Tati and on the Impakwe, these ruins must correspond closely to them in construction. Here as on the ruins at the Lundi, Tati, and the Impakwe, the herring-bone pattern runs round a portion of the building; but in addition to this we have the pattern formed by

placing stones edgewise, which occurs on the round tower and on the fortress temple at Great Zimbabwe, and again the pattern is curiously placed. First to the right comes the herring-bone pattern running over the chief entrance as a lintel for about six yards; here it ends, and two feet below it begins the other pattern running for the same distance; then there is a bare space to the front, where the pattern was presumably continued on the inside of the wall which is now broken down. Then it is continued on the outside for a space, and finally on the inside, where it terminates. These patterns are exceedingly curious features in the ruins and must have had, as we hope shortly to prove more fully, to do with the orientation, for they never go entirely round a building, generally decorate the wall at the same aspect, and as at Great Zimbabwe enclose the sacred precincts as it were in its course.

Above the pattern and over the principal entrance ran a line of loopholes, a feature which we had not found in any of the other ruins, and the best portion of the wall has been battlemented on the outside, the front portion being raised two or three feet higher than the back. The wall is 11 feet 6 inches at its thickest as against 16 feet at the Great Zimbabwe; it narrows off and is more carelessly built to the northwards just as the wall of the great circular ruin did, and on the wall holes were left which had evidently had monoliths inserted in them as before mentioned.

The most marked feature here are the doorways, all square and similar in construction. A space of seven feet had been left in the walls; two feet on either side was then built up, thus leaving an entrance of three feet, which entrances, as I before mentioned, were also walled up as for a siege. The interior was divided into chambers as is seen on the plan. Outside the walls of the fortress we found many circular foundations, very regularly built of granite blocks, and varying in diameter from six to fifteen feet. They were built in groups at considerable intervals apart, and we counted over forty of them. Some of them have a double circle as if for a step; the probability is that they formed the foundations of stone huts like those found in the Marico district of the Transvaal, and were the homes of the ancient inhabitants under the protecting wing of the fort. There are a few other traces of buildings of small account near Matindela.

About 12 miles to the north, near a mountain called Chiburwe, on another low granite hill we found another fort with similar circular foundations on the plain around it. This fort is about 40 feet in diameter, and the walls are of the best style; regular as to its courses, and with closely fitting stones, it is distinctly a better building than Matindela, and corresponds to the best of the buildings at the Great Zimbabwe. Here, too, was another gigantic baobab-tree, which had grown up in the wall and knocked it down.

We reached the Sabi river a few miles below its junction with

the Odzi. It is a fine stream here, rapid and broken by many rocks. About a mile above our camp it passed through a narrow defile, and the views over the Manica Mountains were very fine. Sloping down to the river are grassy banks, which look exceedingly fertile. In this valley everything could be grown; with little or no trouble the natives grow for themselves far more than they want—rice, grain, and tobacco. Everywhere we could obtain magnificent tomatoes, sweet potatoes, and a curious and delicious form of cucumber, also chilis of the very strongest form. It is exceedingly curious to see here in profusion products which have hailed from the New World; sugar-cane, maize, tobacco, tomatoes, yams, and chilis are, I am told, certainly imported, doubtless by the early Portuguese traders, who exchanged the seeds of the New World for native produce, and now they are to be found in luxuriant profusion round every kraal, speaking volumes for the productive capacity of the country.

The fruits are forbidding and highly astringent, especially the Kaffir orange, which grows here abundantly, and from indulging in which we made ourselves miserably sick. We had our misgivings as to the healthiness of the Sabi valley, but to our surprise we found ourselves far better here than we had been during our long stay on the higher veldt near Great Zimbabwe.

Passing through Gambiji's and M'tigeza's countries, past Mount Wedza and the iron-smelting villages, all of which afforded us a large fund of primitive interest, we joined our waggons at Fort Charter and proceeded to Fort Salisbury. From here we made a trip up to the Mazoe valley to see the old workings and an interesting sort of the best period of ancient construction, which protected the miners, but as I wish to enter more into detail concerning our journey to M'toko's country, I must perforce pass over much reluctantly.

During these wanderings we had ample opportunities of studying the natives and their customs, and I must say that I think the general verdict on the Makalanga is too hard. We had from fifty to sixty of them working for us at Zimbabwe, and many afterwards who acted as bearers for months at the small remuneration of a blanket a month, and we never lost a thing. We found them exceedingly obliging and faithful, crowds were round us at every kraal, and no one attempted to steal from us. Doubtless on the traversed roads and large centres, where they are brought into contact with traders and would-be civilisers of the race, the people become thieves and vagabonds; but in his primitive state the Makalanga appears to me naturally honest, exceedingly courteous in manner, and cowardice appears to be their only vice, arising doubtless from the fact that for centuries they have had to flee to their fastnesses before the raids of more powerful races. The Makalanga is above the ordinary Kaffir in intelligence. Contrary to the prognostications of our advisers we found that they rapidly learnt their work, and were very

careful excavators, never passing over a thing of value, which is more than can be said of the white man. They are good natured, as we experienced at Matindela, where it rained and was wretchedly cold; our naked bearers shivered round the fire all night, singing and talking gaily, and crowing like cocks to make believe that dawn was coming before its time.

Some of them are decidedly handsome, and not at all like negroes except in skin; they are handy workmen, carving knives and pillows with considerable skill; they make their own iron in their clay forges with charcoal, bellows, and blowpipe; they have a certain knowledge of making textiles out of bark, specimens of which I have with me. They are musical, and easily take up a tune from one another, and reproduce it on their native pianos. They are decidedly vain and particular about their personal appearance, having just as regular fashions in beads and cloths as our ladies at home. Before visiting a fresh kraal our men used to love to polish themselves like mahogany by chewing the monkey-nut and rubbing their skins with it, good-naturedly doing each other's backs and inaccessible corners.

Tattooing, or rather cicatrices, on the body form a chief item in female decoration, and vary according to tribes. Our lady friends around Great Zimbabwe, in what is known as Chibi's country, are decorated with these cicatrices in narrow lines across the stomach, from thirty to forty of them, very straight and slightly raised, so that the general effect is as if they had submitted themselves to a course of tight lacing. In Gambiji's country the women have on the same part of their persons dots in squares; whereas north of Salisbury, in Kunzi's and M'toko's countries, the fashionable design is a sort of conventional lizard, a pattern which occurs on their divining tablets.

The Makalanges compare favourably with other Kaffir tribes, in that the men till the fields and do the hard work, whereas the most arduous duty the woman has is to carry up to the top of the kopje the water for her domestic purposes and grind the grain. Certainly one cannot help feeling when amongst them the influence of a bygone civilisation and the hope of development for the future.

I am now, in conclusion, going to relate a few of our experiences in M'toko's country, which is the most out-of-the-way region we visited, and where the customs of to-day bear a close resemblance to those described by Dos Santos 300 years ago. Here as yet very few white men have penetrated, and certainly no white lady, consequently my wife created undisguised astonishment and alarm amongst them; at every village she had to take down her hair and show its length, and the report of this wonderful phenomenon travelled quicker than we did, so that she would be greeted on arrival with cries of "Hair, hair." On more than one occasion she had supernatural powers attributed to her of which she is wholly innocent.

We went to the chief M'toko's under most favourable circumstances, being the bearers of a present from the Chartered Company which was supposed to represent the value of 40*l.* in commodities of varied and to our ideas trivial nature. The best interpreter they had was placed at our disposal, and I will take this occasion for publicly thanking the officials of the Chartered Company for their universal kindness in making arrangements for our comfort both at Great Zimbabwe and elsewhere, and enabling us to accomplish what under different circumstances would have been an impossible journey.

The distance traversed from Fort Salisbury to M'toko's is about 120 miles through very fine mountain scenery, and broken country inhabited by sundry petty chiefs, who all have a wholesome dread of M'toko. Owing to the favourable position of his country M'toko has had fewer raids than any one else, neither Kobengula nor Gungunyama having penetrated so far, his only fear being from Gouveia and the Portuguese on the east, and these he has managed to keep out of his country altogether. Consequently the disposition of the kraals is here quite different, being dotted in little groups of from six to twelve, all over the country in fertile spots, the protection of the stony mountains not being deemed necessary. The chief's kraal is also a small one, and situated beneath a very steep granite hill on the slopes surrounded by fine timber. Innocently we thought to avail ourselves of this shelter and pitched our camp about a quarter of a mile from M'toko's kraal; but despite our prospective presents and manifest good will, we were peremptorily ordered to retire for at least a mile by angry natives; our deputation to the chief himself was of no avail, for he fearing to be seen of white men until he had held a consultation with his *indunas*, had precipitately retired to a cave. Somewhat indignant we retired to the spot allotted to us and sent a few presents by way of an instalment, which were received with sufficient grace.

Next morning M'toko himself consented to visit us in our camp and receive the gifts. He came with exceeding caution with about 50 armed men, stopping for palavers every quarter of a mile, and finally waiting for fully an hour before he would consent to come to our camp. He wanted us to send the presents, but on this point I was firm, and replied that if he wanted them he must come in person. So at last he came, and he was actually trembling with fright, affirming that he dare not receive the presents, for the white lady had been seen to bewitch them by sprinkling water on them. The appearance, however, of a full uniform of the Cape Rifles, sundry yards of cloth, looking-glasses, knives, and handkerchiefs, got the better of his fear, and he graciously consented to receive them, but at the same time refused to sit on any of our rugs; during our audience he never regained his composure. He gave us a bullock, a goat, and 20 lbs. of meal in return, which came in very well to replenish our impoverished larder. Afterwards we found out the

cause of M'toko's shyness. A few days after Mr. Selous's visit and the signing of the agreement with the Chartered Company, his father had died, and he believed the white lady had been sent to encompass his end.

In M'toko's country the religion of ancestor worship is maintained in all its ancient purity. Once a year at the Zimbabwe or royal kraal, there is a grand sacrificial feast to the Mozimos, or spirits of the ancestors. They believe in a mysterious Being called by them Muali, who is all supreme, between whom and mankind the Mozimos or ancestor spirits of good men act as mediators and intercessors, whereas bad men become Mashavi or devils, and wander about to produce the ills of life. At the annual feast bullocks are slaughtered, much beer is drunk, blood is sprinkled over every one, and a portion of the feast is set aside for the ghostly ancestors.

In M'toko's country the Mozimos are supposed to enter into lions, which they call Mondoro, a sort of spiritual lion, who fights for them in their wars, and as they say in their last fight with the Portuguese, these lions were seen attacking and consuming a portion of Gouveia's forces. The chief priest of the country is an uncle of M'toko's, and is called "the Mondoro," or lion priest; he is the public sacrificer at the annual feast, and is said to have more power in the state than the chief himself. With some difficulty, for the people seem to have a repugnance to discuss religious topics with white men, we found out where the Mondoro lived, at a little village called Intzi, about six miles from the chief's kraal. Thither we went one day, and found the old man particularly agreeable and communicative, and not nearly so much afraid of us as his nephew. He claims for himself the succession to the chieftom and spoke with great contempt of his nephew. "Here is now the Zimbabwe of M'toko," he said, "here we have the annual sacrifice," and from all we could gather, all the elements of civil war are here existing.

On the subject of the lion god he spoke freely; "Our lion is friendly to us and to our friends; any lion that attacks you you may shoot, as it cannot be one of ours." This was in answer to the question whether, as report said, we should get into trouble if we shot when in M'toko's country. There is a distinct belief amongst them of an after life, and a God Muali who lives in heaven.

Oddly enough there is a trace of a Sabbath amongst them. In the ploughing season they work for five days, and the sixth is proclaimed by the chief as a holiday, or Muali's day, on which they remain idle and get drunk. This Sabbath, however, only continues during the period of hard work, and probably arises from the recognition amongst them of the value of rest in a time of labour.

Much the same customs as these and many more we found existing in Mangwendi's and Makoni's countries, and they particularly interested

us as bearing testimony to the accuracy of Dos Santos, who describes the sacrificial feasts and the day on which they do not work. Then again, the story told by Karl Mauch about the wonderful sacrifice to "Mali" at the Great Zimbabwe ruins is also confirmed by this.

Another point of interest which we found throughout the countries of Mangwendi and Chipunza are the numerous ruined kraals, fortified with stone walls, on the granite heights. There are so many of them about here that we must suppose a large population at some previous date. Certainly the intricate passages and elaborate form of defence somewhat recall the ruins at Zimbabwe; but here the walls were constructed only with large blocks of stone put together anyhow with mortar, and in no way trimmed into shape or courses, just the sort of walls that an unskilled people having before them Great Zimbabwe as a copy would construct. Even these rude stone kraals appear to be of considerable age; one of them near the Chimbi river has an underground passage constructed with huge slabs of granite, evidently connecting the fortress with its water supply below. But this is now nearly filled up with debris, the walls are fallen to pieces, and roots which have grown therein would point to the abandonment of these spots for generations. The solution of this question is a difficult one, but it appears to me that these walled kraals and rock-set fortresses in Mangwendi's and Chipunza's country must have been erected in the powerful days of the Makalanga chiefs, the Monomatapa, who had acquired by tradition a certain heritage of stone building.

In this part of the world we also constantly came across curious semicircular structures surrounded by graves far distant from any present point of habitation. They are rough graves, ill constructed, and are of obvious Kaffir origin, doubtless where chiefs have been buried for ages, and where the sacrifice for the ancestors took place. One of these near Mangwendi's kraal was pointed out to us as the spot where they carry out this ceremony still.

The so-called Bushman drawings are very frequent in these parts, generally decorating some granite rocks sloping inwards. A rock called Nyanger, about 12 miles from Mangwendi's, interested us particularly. It was strongly fortified with walls on the top; around it were semicircular buildings surrounded by graves, and to the east was a big cave, also filled with graves covered with a sort of cement, with the bodies inside wrapped in skins. The whole of the cave rock was covered with splendid specimens of these primitive drawings in distemper of red, yellow and black, offering three distinct periods of work, a faint set of drawings of quaint and unknown forms of animals; some excellent presentations of antelope, elephants, &c., which would not have disgraced a Landseer; and then again some rough representations of animal and human form would point to a more recent period.

Notes on the Geography and Meteorology of Mashonaland.

By ROBERT M. W. SWAN, Esq.*

(Read at the same Meeting).

As requested, I have put together a few notes on the nature of the country we traversed. Central Mashonaland consists of elevated granite plateaux, varying in height between 3000 and 5000 feet. Through the surface of these plains rise groups of isolated little granite hills which are most remarkable and varied in form, and which sometimes attain an elevation of 1000 feet above their base, but more frequently they are about 400 feet high. Generally, they are composed of enormous broken blocks of granite, but often they are dome-shaped and of one unbroken mass of rock, and suggest the idea of huge bubbles on the surface of a molten mass. The summits of the latter kind of hills are of course quite inaccessible. They are not hills left in relief by the denudation of the surrounding country, but judging from exposed sections of some that I have seen they have been elevated by a force acting at a comparatively small distance below the present surface, and they are older than the stratified rocks of the country.

On the granite plateaux one meets with patches of stratified rock—of quartzites and schists, and rarely some crystalline limestone. Magoesia too is sometimes present, notably at 'Mtali, and in the steatite which occurs near the Great Zimbabwe, of which many of the objects found in the excavations were made. The strike of the strata is generally east and west, and the various patches arrange themselves in several fairly continuous lines running across the country in the same direction as the strike. These semi-continuous deposits or belts of stratified rock are generally two or three miles wide, and in them occur the gold-bearing quartz reefs. The most southerly belt that I know of in Mashonaland proper passes by Fort Victoria, and probably crosses the Sabi river about latitude 20°. The next large one passes by 'Mtali and the 'Mfoll river, where it crosses the waggon-road, and so on to Hartley Hill. This belt includes Mount Wedza, the highest mountain in Mashonaland. Next in order comes the Mazoe deposit, which perhaps also includes the Kaiser Wilhelm gold-field. These deposits are all fairly similar in nature, and probably represent a continuous sheet of stratified rock, all of which has been denuded away except the above mentioned belts. They generally present a rugged surface, elevated in mountain ranges, which often rise 1500 and 2000 feet above their base, and, although they are nearly always steep, they are rarely precipitous. These mountains are regular and beautiful in outline, and refresh the eye after it has grown wearied of the grotesque forms of the granite hills. The soil on the stratified rocks is more fertile than it is on the granite, and the vegetation is more charming; the very coarse grasses of the granite soils being replaced by many flowering plants.

The ruins which have just been described are all built on granite, but are generally within a short distance of the quartz formation, and the ruins at Zimbabwe are within four miles of the southern edge of the quartz belt. At Zimbabwe we found little clay crucibles in which gold had been melted, and an accumulation of quartzite rock which had been obtained from the casing of a quartz reef. I carefully tested this rock for gold, but could only find a very minute trace, so I conclude that it had been rejected as too poor for treatment. While at Zimbabwe, whenever I could spare time from the excavations, I made excursions to the quartz belt, and searched for old workings and gold reefs. I found one reef carrying a small quantity of gold, but no old workings. Since then, however, rich gold reefs have been discovered about 20 miles to the north-west of Zimbabwe, and from these probably the ancients obtained their quartz. The quartz formation near the little ruin at

* Mr. Swan is responsible only for the cartography of the map along his route.

the Mazoo river has been much worked for gold, and the Manica belt seems to have been even more exploited. Where the high plateau breaks down at Massi-Kessi an enormous amount of alluvial has been worked. The old people must have obtained, from both the alluvial and the reefs, a great quantity of gold to repay them for the work that they did, and there is no reason to suppose that they have exhausted the reefs; indeed I have seen at the bottom of old workings the reef continuing and carrying visible gold.

Besides gold reefs, these quartz belts contain much iron ore, and some manganese. In two isolated patches of the quartzite formation at the Dorob Mountains near the Sabi river, I found great masses of rich magnetite and hematite, and on the top of Mount 'Nyaguzwe, near Fort Victoria, there is also a mass of magnetite—in fact, so very abundant is iron ore, that compass bearings can rarely be taken with safety from hills in the quartz formation. Along the right bank of the Sabi river, near Mount Weda, are many native villages, whose one industry is iron smelting. They obtain the ore from Mount Weda, which is renowned far and wide in Kaffirland as an iron-producing mountain. The mineral they select is not very rich, and is consequently more easily smelted, and it contains some manganese. The iron they produce is very pure, and is consequently soft and easily fashioned into weapons and tools. Their anvils are simple blocks of hard diorite, on which they hammer with another smaller block.

Regarding the maps, I would mention that I checked my chronometer at Kimberley and Mafeking, and also at Palapye on April the 18th, by telegraph from the Cape Observatory, and I rated it at every place where we stopped for any length of time. I also checked our motion in longitude as far as possible by compass bearings on prominent mountains along our route. This I was able to do pretty effectually from Zimbabwe to 'Mtali, but from Palapye to Zimbabwe, owing to the nature of the country and the direction of our route, it was more difficult to get useful compass bearings. I fixed about 120 points by astronomical observation, and at nearly all these points I took three sets of observations. I also ascended the nearest mountain or eminence to the point thus fixed, and fixed a number of minor points by cross-compass bearing from this and other fixed points. In drawing the maps I have avoided drawing in any mountains or other features of the country of which I have not fixed the position; and where I have seen mountainous country, but have been unable to fix the direction and distance of the ranges or the position of the peaks, I have not attempted to draw them in, but have merely written the word "mountains" on the map in the approximate position. The map, therefore, seems very much of a road map, but I have thought it better to sacrifice its appearance than to puzzle future travellers with mountains whose positions have not been carefully fixed. In ascertaining the courses of the rivers, I ascended many hills, and from these hill-tops I was able to fix the direction of their flow for some distance on each side of the road. Where I have not been able to make such observations I have merely dotted in their probable courses. I have always been careful to ascertain from the natives what river each tributary fell into, and as nearly as I could the distance of the confluence from the point where we crossed the stream. They could always, at once, tell me what river the tributary joined, but their information regarding the distance was less definite.

The tributaries of the Sabi river flowing near Zimbabwe have been ill-defined on previous maps. The 'Mpopotokwe joins the 'Mtelekwe and the 'Mahagaabe flows into the united stream a short distance south of Zimbabwe. This river, under the name of the 'Mtelekwe, then flows into the Luinde, and not to the Sabi direct. The Tokwe joins the Luinde farther north. The most interesting geographical work that we did was on our expedition to the Sabi river, and on that from Fort Salisbury to 'Moko's, and down by Mangwendi's and Makoni's country to 'Mtali. On our journey to the Sabi we crossed a great many of its western tributaries, and as the

same streams rose near the waggon road, and we crossed them pretty far down their courses, we were able to lay down their direction for a considerable distance with certainty. The Sabi river itself, in latitude $19^{\circ} 15'$, we found was placed 20 miles too far west in former maps, and from the information which I gathered from the natives, in the latitude of Zimbabwe, it must be about 50 miles further east than it is placed in these maps. This river, where we struck it, was a considerable stream flowing rapidly over a rocky bed. It had fallen about 1800 feet from its source near Fort Charter, and had 2700 feet more to fall before it reached the sea. When it has received all the tributaries we crossed it must be a very big river.

Going from Fort Salisbury to Mtoko's we crossed many tributaries of the Mazoe river, which were either not shown at all in former maps, or were most inaccurately placed. We recrossed these streams again further up returning from Mtoko's to Mangwendi's. I also got excellent views of them from the various mountains which I ascended, so that I am able to lay them down in the map with certainty. To the eastward of Mtoko's we could see the high veldt breaking into mountain ranges as it descended towards Gouvenia's country.

Approaching Mangwendi's and also going between Mangwendi's and Chipunza's, our way lay along a very high watershed, on the western side of which rose some of the eastern tributaries of the Sabi river, the most important of which was the M'shike. At Makoni's we reached the highest part of the plateau, and this is, with the exception of some villages on Mount Yenya, the highest inhabited part of Mashonaland. From Makoni's to Mount Yenya the country is broken, and the descent is very rapid, but on the east of our route the descent was still more rapid and the mountains more imposing. On the north side of Mount Yenya flows the Odzi river, which is there a very considerable stream. Mount Yenya is a most imposing mountain and the highest in Mashonaland, with the exception of Mount Wodaa. It rises to a height of 5800 feet above sea-level, and within 300 feet of its summit are several villages which own a considerable number of cattle. It probably represents the Mount Dao which the Portuguese place on their maps about this part, and which they say is 7900 feet high, for certainly there is no mountain near Mount Yenya of equal height. Between Mtali and Maasi-Kessi the country is extremely mountainous, and the scenery is the grandest that we saw in Mashonaland. We lost 1400 feet in height between these two places. A short distance after leaving Maasi-Kessi we crossed the Revwe river, and our way lay along a watershed about 2000 feet high. This watershed is thickly wooded, and is traversed sometimes by deep ravines. On the left hand the streams flowed to the Pungwe river, and on the right to the Revwe and the Muda and Mutuchini rivers. Approaching Sarmento, the country falls rapidly to nearly sea-level, and thence to the coast we traversed a flat alluvial country through which the Pungwe river sluggishly flows. This swampy level country swarms with game, especially towards the end of the dry season, but the vegetation is not nearly so luxuriant as one would expect, and some parts of this country are quite bare.

I have been careful to spell the native names on the map in accordance with the rules laid down by this Society. The sound of the Rushman clicks which occurs so often in the names of places and in the names of tribes derived from the names of places, but most frequently of all in the names of rivers, is slurred over by the present tribes, and represented by a combination of letters. As I know of no rule for the spelling of these sounds, I have represented them by an inverted comma and the consonant nearest in sound.

A point of interest in the remote history of the country and of the ruins which we examined—for the old people doubtless entered the country by this coast—is the growth of the land at the mouth of the Pungwe river and around Sofala. From about Sarmento down to Beira one passes over a low alluvial country which has been

slowly encroaching on the sea for ages. I am sorry that in the rush to the coast I did not have time to collect data to enable me to form any idea of the quantity of mud deposited from the waters of the Pungwe in a given time, but its waters hold in suspension a great quantity of fine clay derived from the decomposition of the granite in its basin, and this is deposited where the river enters the sea. The distance from Sarmiento to Beira as the crow flies is 65 miles, so that at some period the road to the interior must have been shortened by this amount, and even in early historical times some part of the journey across the low fever belt would have been saved. The site of ancient seaports will now be far inland, so it need not surprise us that remains of these ports have not yet been found.

Owing to frequent absence from camp, I was unable to read the thermometer and barometer as continuously and regularly as I could have wished, but the readings which I did take give us some idea of what the climate at Zimbabwe was in June and July last year. We arrived there on the 6th of June, after a week of south-east winds, high barometer, and rain and mist. The wind then gradually fell and the barometer with it, and we had three weeks of fine calm weather. The barometer reached its minimum on June 27th, and at the same time the difference of the readings of the wet and dry bulb thermometers was at its maximum. The air was then very dry and the sky clear, with light north winds which were evidently local in origin, and the temperature at night fell below freezing-point so that in the morning we saw a light deposit of hoar frost. Immediately after this the barometer began to rise, there were light south-east winds, the atmosphere became moister, and on the 4th of July the south-east wind had increased considerably in strength, and some rain fell. From this time until the end of our stay at Zimbabwe on the 2nd of August the barometer slowly rose and fell, its range being limited to about three-tenths of an inch, and whenever the south-east winds blew at all strongly the barometer rose and we had mist and rain. We had during this period generally about a half-day of rain each week.

At first sight it seems surprising that we should have windy wet weather with a high barometer, but we must remember that the only winds which can bring rain to Zimbabwe, at least in winter, are the south-easterly winds, and these, like all other winds blowing towards the equator, increase the atmospheric pressure. Zimbabwe is situated on the edge of a plateau about 3400 feet above sea-level. The country breaks down gradually towards the south and east, and more rapidly towards the west, while towards the north it rises gently until after about 100 miles it attains an altitude of nearly 5000 feet. The west winds, if they do blow, have to traverse the continent and the high country about the sources of the Limpopo before they reach Zimbabwe, and the northerly winds would tend to increase in temperature after falling from the high country towards the north. The predominant winds in this latitude are the south-east trades, and they, carrying their moisture from the Indian Ocean, are forced to rise as they pass over this country, and they consequently expand and are lowered in temperature and so deposit much of their moisture on this edge of the high plateau. A similar winter climate seems to prevail in most parts of Mashonaland, the edges of the plateaux receiving most of the moisture. Manica is situated much nearer the sea than Zimbabwe, and the country there falls much more rapidly towards the east (it falls 1400 feet in ten miles at Mtali) and consequently the rainfall there is heavier. Fort Salisbury is better situated for a dry winter for it is in the middle of a high plateau and the south-east winds will have parted with most of their surplus moisture for that altitude before they reach it. The driest time of the year in Mashonaland is from August to November. I may observe that the greatest difference I observed in the readings of the wet and dry bulb thermometers was 24° F. at the Mshabetai river, at an altitude of 2140 feet, on May 13th, at 2 p.m.; the readings being 64° and 88° respectively.

List of Stations in Mashonaland Astronomically Observed, with Altitudes.

By ROBERT M. W. SWAN, Esq.

Stations.	Latitude.	Longitude.	Height.*
	° ' "	° ' "	feet
Mafeking	25 51 1	25 41 0	
Ramatlabama river	25 37 57		
At Pan	25 30 13	25 8 15	
Kanya, 11 miles S.E. of	25 7 2	25 8 15	3580
Kanya	24 58 30	25 16 0	3750
Molopolole	24 25 30	25 21 0	4020
Molopolole, 4 miles N. of	24 21 30	25 21 30	3872
Klippan, 1 mile N. of	24 17 12		4020
Kurumurwa	24 8 33		3570
Khemi	23 50 8		3490
Boatlenama, 15 miles S.E. of	23 42 20	25 35 30	3540
Boatlenama	23 32 30		3400
S. of Selinia Pan	23 27 11		3170
N. of Selinia Pan	23 20 51	26 3 15	3050
Near Hataloklu Vley	23 15 4	26 10 53	3140
S. of Shoshong	23 8 47	26 19 30	3160
Near Shoshong	23 4 0	26 28 0	3310
At stream	23 1 57	26 41 30	3260
Near Mahalapini river	22 57 41	26 51 15	3240
Ohuluan Vley	22 46 0	27 6 30	3010
Palapye	22 37 30	27 18 0	3150
At Lotsani river	22 32 45	27 21 30	3740
At Lotsani river	22 33 58	27 34 0	2480
At Lotsani river	22 32 37	27 46 45	2450
Near Elibi Fort	22 31 55		2300
Near Elibi Fort	22 32 55	28 10 30	2290
At Muralla Vley	22 31 30	28 21 30	2275
Makwenja river	22 15 20	28 24 15	2400
Pakwe river	22 7 38	28 31 0	2230
Marapong river	22 8 39		
Mutlaputla river	22 0 42	28 38 15	2010
Maklutsi camp	21 54 20	28 41 0	1870
Maklutsi river	21 49 55	28 52 0	1920
Metsimachokwan river	21 53 2	29 0 40	2080
Semalali	21 53 17	29 14 0	
Baobab Spruit	21 55 20	29 20 15	
Fort Tuli	21 51 59	29 36 15	
Ipagi river	21 48 30	29 42 30	
Sigabi river	21 39 7	29 48 15	1720
Msingwan river	21 26 22	29 57 15	2140
Umshabetsi river	21 21 57	30 6 15	2330
Mount Yanda	21 20 30	30 14 0	2090
Bubiye (Buby) river	21 11 34	30 23 15	
Inyamanda	21 9 10	30 30 20	2250
Mount Host	21 8 16	30 38 30	1910
Near Nwanetsi river	20 59 23	30 41 0	1880
Near Nwanetsi river	20 49 49	30 42 0	2130
Near Mount Ibonda	20 41 6	30 44 45	1970
Lunda river	20 35 54	30 45 0	2130
Near Naka Mountains	20 27 9	30 47 30	2580
Umlala	20 23 5	30 53 30	2380
Tokwe river	20 11 11	30 57 45	3090
Providential Pass			

* The heights have been obtained with an aneroid, and are only approximate.

Stations.	Latitude.			Longitude.			Height.
	°	'	"	°	'	"	feet
Port Victoria	20	7	53	31	0	0	3380
Zimlabwe	20	16	30	31	7	30	3340
Umsahagasho river	20	3	40	..	..	..	3290
Mukori	19	38	29	30	58	30	4200
Chokata	19	38	49	31	3	0	4100
Gona	19	36	52	..	..	..	4350
Umsungana	19	31	30	..	..	..	3650
Kutmasanga's	19	34	19	31	37	0	3250
Little	19	34	12	..	..	..	3600
Matindola	19	30	23	31	51	45	3350
Near Mount Wizingo	19	17	0	..	..	..	3250
Near Mwaivari river	19	14	56	32	2	15	2900
Mukubu river	19	8	45	32	4	15	2700
Sabi river	19	7	40	32	1	30	2500
Ampai river	19	6	41	..	..	..	2950
Zamopera	19	0	17	31	39	15	3600
Mafusaire's	18	56	26	..	..	..	3950
East of Smet's kraal	18	51	25	..	..	..	..
West of Kwendu's kraal	18	48	23	31	25	45	4220
*Mugosa's	18	48	30	31	16	45	4570
Fort Charter	18	35	40	31	9	45	4498
Umfuli river	18	18	35	31	5	30	4080
Near stream	18	10	15	31	10	15	..
S. of Manyani river	18	0	22	31	3	15	4400
Fort Salisbury	17	49	30	31	4	15	4820
Fleming's camp, Mazoe river	17	32	48	30	56	0	..
Yellow Jacket mine, ditto	17	28	32	31	4	15	4030
Madelaywa's	17	48	30	31	12	0	..
Musungaikwa's	17	52	33	31	20	15	5010
Nora river	17	55	18	31	29	0	4470
Kunzi's	17	53	40	31	33	0	4400
Yandoro's	17	47	0	31	41	45	4720
Bambabashla's	17	40	30	31	48	0	4410
Mabumo river	17	31	0	31	57	45	3420
Near Lutsa	17	23	30	32	9	0	3450
Near Mtoko's	17	23	50	32	14	0	3400
Inyandou river	17	32	5	32	8	30	3600
Inyamashupa river	17	39	22	32	2	15	3600
Near Mount Masunagwai	17	50	12	31	51	15	4950
Yaungurukwe river	17	59	25	31	45	45	4700
Mangweni's P.S.	18	6	42	31	39	30	4870
Nyanger Mountain	18	15	20	31	46	0	4850
Chikamondi river	18	21	6	32	56	30	4810
Mount Ruanda	18	22	30	32	7	50	4830
Chipanza's	18	27	30	32	10	15	4450
Near Chigono's	18	33	50	32	17	0	4450
Near Yanya Mountains	18	45	0	32	22	45	3620
Odai river drift	18	45	50	..	..	..	3420
Umtsoa's	18	44	30	32	29	0	4170
Umtali, our camp	18	53	50	32	32	45	3600
Masikesi (Port. camp)	18	53	45	32	44	30	2200
Munoni river	18	56	50	32	50	30	2140
Lusaka river	18	59	27	33	2	0	2000
Yundusi river trib.	18	59	10	33	13	0	2000
Near Chinosa's	18	59	0	33	20	0	2140
Zombana river	18	57	15	..	..	..	1930
Makumboso river	19	2	10	..	..	..	120
Vley	19	8	35	..	..	..	100
Motuehidi river	19	16	40	..	..	..	50
*Mpanda's	19	23	30	34	32	30	20

The following discussion ensued after the reading of Mr. Bent's and Mr. Swan's papers:—

Mr. E. A. MAUND: Having recently traversed Mashonaland, I have listened with extreme pleasure to the admirable address of Mr. Bent. A year ago I had the honour of addressing you on Mashonaland and Matabeleland when Mr. Bent was going out to visit these ruins; Mr. Bent then speaking of the archaeological value of the photographs displayed, said that I was a little bold in speculating that they were possibly Phœnician, because a gold industry was connected with them; he, I recollect, considered that they were probably Persian: he has now been, seen, conquered, and come to tell us that they are Arabic. When up country I visited these ruins myself, and saw the great work that Mr. Bent had gone through with the limited means at his disposal. There can be no doubt that Mr. Bent has shown that this building was connected with the great gold industry, the roasted quartz hidden away in the cave, the crucibles, crushing-stones, and other implements all point to this; but, besides this, all accounts of Monomatapa in the 16th century speak of it as a great gold-producing country. The natives traded their gold with the Arabs at Sofala for Indian goods. Now, at Victoria, within 15 miles of these ruins, rich gold discoveries have been made, though, as Mr. Bent said, there were no gold-bearing reefs within the immediate vicinity of the ruins. I visited the various gold-fields in Mashonaland, Hartley Hills, Umswezie, Mazoe, and Umtali fields, and it is astonishing to see the amount of work done by the ancients; millions of tons have been overturned, and thousands of slaves have been employed, for it can have been nothing else but slave labour, as is evident from the crushing-stones. These stones are often found in rows close to the mines, as if the natives had been chained to their work, and close alongside in the watercourses you will find the rice holes which fed the ancient population. Now, in the country I have traversed with Mr. Williams, a mining engineer, there are splendid evidences of rich reefs; little mining prospecting has been done, but where it has been done there have been rich finds. The country has been visited by politicians, experts, and travellers, and they have all brought back their stories, but the country is not certainly advanced enough yet for politicians or experts. I see no reason to go back one jot or tittle from my statement made here last year, whatever may be the reports of those gentlemen who go there and do not find the country cut and dried to their hands. With the country generally Mr. Bent has not dealt in his paper, which has been exclusively archaeological; but the magnificence of these rolling plains, the valleys with splendid watercourses of permanent water, capable of great agricultural development, and the wood-clad hills, are to my mind, both on the plateau towards the north-east and down towards Matabeleland in the south-west, inferior to nothing in South Africa. I won't detain you longer than to say that I travelled down with Mr. and Mrs. Bent, and must compliment Mrs. Bent upon her pluck and endurance in overcoming the immense difficulties which many a tenderfoot has come back to England and dilated so much upon as being impossible for them to overcome, and therefore they have to a great extent condemned the country; however, within a year we hope a railway, or the first stage of a railway, will pass over this difficulty, and then I believe Mashonaland will speak for itself as to its richness.

Mr. H. H. HOWARTH: I only wish to add one or two words on the archaeology of this district. One of my friends, Mr. Henry Tant, who has lived a long time in the country, has discovered some curious remains of an old settlement under the sand on the Sofala coast, which doubtless belong to the same period as the ruins discovered by Mr. Bent. I should also like to refer to some wonderful bowls of Chinese celadon, which have been found in the kraais of some chiefs on the Sofala coast. Sir John Kirk has got quite a number of these bowls, which were hung up in

huts of the chiefs, who, although they know nothing whatever about them, consider them as heirlooms. This is of supreme interest in connection with the archaeology of this particular region. One of the most interesting discoveries made by Mr. Bent was that of similar fragments of Chinese celadon and Persian porcelain among the ruins. We know that the same kind of bowls have been found in Borneo, a long way from Sofala, but the fact of their being found in both places makes it nearly certain that no other race but the Arabs of the ninth and tenth centuries can have brought them, for we can approximately date the particular fragments when there are no other means of dating the objects. It appears clear that these particular fragments date from about the ninth century, when the materials for the tale of Sinbad were being collected. There can be no doubt, however, that the ruins themselves, the sculptured figures and towers, belong to a period before Muhammed. It would have been impossible in Muhammedan times for these Arab emigrants to have carved figures of animals so absolutely contrary to all their principles, and this points no doubt to a great age, perhaps to the early voyages of the Phoenicians and the people of Punt, who supplied Egypt and Palestine with African products; but the point I meant to draw attention to is that the Arabs must have been there down to the end of the ninth century, because we know the two first Arabs who landed in China and brought back the first intelligence the Arabs had of the Chinese, made their voyage about that date. Their report has been edited by Renaudot; so, by means of this porcelain, we are able approximately to fix the later date of the history of these ruins.

The President: This is very much the largest meeting that we have had since the great gathering to welcome Stanley in the Albert Hall. You came expecting a great deal from Mr. Bent; you have not been disappointed, and I know that I have your mandate to return your most sincere thanks to him and also to Mrs. Bent, who was so excellent an assistant to him, and to whom we owe a great deal of the pleasure of this evening, for I understand Mrs. Bent did all the photographs. You are also, I know, obliged to the various gentlemen who followed Mr. Bent and took part in the discussion.

Mr. Bent, in acknowledging the vote of thanks, said he was much obliged to Mr. Howorth, whose remarks were most valuable, as he fixed a date that had been to Mr. Bent a great difficulty. Mr. Bent could throw the ruins back to a pre-Muhammedan period, but then came the difficulty; in all probability, considering the different styles of architecture in the ruins, they were centuries older, but that question he left for future speculation. When he said that he had found them to be Arabian and pre-Muhammedan, he had done what they required of him.

The Orientation of the Buildings at Zimbabwe.

By ROBERT M. W. SWAN, Esq.

THE evidences of orientation and of an observance of the motions of the sun in the temples at Zimbabwe, Matindela, and the Lunde river are such as might be expected when we consider the nature of the worship carried on in these temples, and, at the same time, are such as would enable the people to mark the recurring phenomena of the solar year. They required something to tell them of the passage of the seasons, and in satisfying this necessity of their life they used much symbolism

having a religious significance. They regarded the sun as the great fertiliser, and on the walls of their temples they constructed ornamental courses of masonry of a pattern symbolical of fertility, to receive directly the sun's rays when it was rising or setting at the summer and winter solstices, thus marking the two great events of the solar year. We have nine instances in these temples of this solstitial orientation, and to explain them I will refer to the plans which accompany Mr. Bent's paper.

An ornament of the above-mentioned kind made of a double row of stones, arranged to form two lines of a kind of chevron pattern, runs partly round the great temple at Zimbabwe and between the points marked A and B on the plan (see *Antea*). 107 feet from A and the same distance from B is the centre of the arc on which this ornamentation occurs, and at this point, which we shall call C, is some ruined masonry which seems to have once formed an altar. Zimbabwe is in S. lat. $20^{\circ} 16'$, and consequently the sun would rise about 25° south of east at the summer solstice. A line produced in this direction from the altar C would pass through the middle of the chevron ornament to the rising sun at midsummer. The same line produced in the opposite direction for 73 feet would fall on an obelisk, of which we there discovered the foundation. Along the wall over the chevron pattern were erected long slabs of stone or monoliths, and one of these probably marked the middle of the pattern, and the others may have marked subdivisions of the year.

At a temple at the east end of the fortress on Zimbabwe hill, where the birds on long beams were found, we have an exactly similar arrangement. We discovered the altar, with several phalli near it, and some among the stones on the altar. The direction of a line drawn from this altar through the middle of the pattern on the wall was 25° south of east, being within a few minutes of a degree, the position of the rising sun at the summer solstice. The ornament on the wall in this case was somewhat different from the other, being a dentelle pattern, or like a chevron pattern laid on its side.

The ornamental pattern on the little round ruin at the Lunde river has a similar aspect, but the interior of the building is so ruinous that no altar can be discovered, and no plan of the interior made out.

At Matindela there is also an ornamental pattern, but on the inside of the western wall. It, too, would face the rising sun at midsummer; but here, as at the ruin on the Lunde river, the altar, if it ever existed, has disappeared.

The instances of orientation, if we may call it so, to the setting sun at the solstices are more numerous. On the great tower which overlooks the wall at Zimbabwe, we have an ornamental pattern of the dentelle kind, which faces the setting sun on the longest day, and at Matindela there is a dentelle pattern, and also a herring-bone pattern over the doorway, both with the same aspect. Between the two there is a loophole in the wall, which may once have passed a ray of light to an altar

in the interior. The doorway also faces the setting sun at the summer solstice, and is narrowed down by buttresses to a mere slit. It may also have been designed to admit a ray of light in the same way as the loophole.

At the west end of the fortress at Zimbabwe we have two instances of dentelle patterns facing the setting sun at the winter solstice, and in front of one of them was erected a very long decorated soapstone beam. This beam had two bands of the chevron pattern cut in it, and going half-way round, and presumably the beam had been erected with this pattern facing the same way as the dentelle pattern behind. At Matindela there is also a herring-bone pattern in a part of the wall facing the setting sun at the winter solstice.

The great curved wall at the western end of the fortress at Zimbabwe is surmounted by little round towers and long erect stones, and these, in conjunction with an altar behind, seem to have marked the position of the setting sun at different periods of the year. The passage along the top of the cliff near the same place has been narrowed by buttresses built out from the sides. These buttresses seem to have served the same purpose as the pylons of Egyptian temples, and to have admitted past their ends a narrow ray of light from the setting sun at the equinoxes. Thus a period midway between the solstices could be fixed.

Over the temple at the east end of the fortress at Zimbabwe there is a great and most remarkable stone, which seems to have been an object of veneration, and probably accounts for the position of the temple below it. A line drawn true south from this stone will pass through the dentelle pattern on the wall, through the main doorway of the great temple 650 yards away below, and will fall on the altar U in the centre of the decorated arc. Before we knew of the alignment of these points we were puzzled to account for the direction of the very narrow doorway through the thick wall, for it is not at right angles to the wall, but runs north and south. This line of sight was probably used to observe the transit of stars over the meridian, and thus to mark time at night. The fortress on the hill is evidently the older building of the two, and had a naturally defused position, and the site of the temple on the plain below was probably chosen with reference to this line.

At first one is surprised to find evidence of so apparently considerable a knowledge of astronomy among the people who built these temples; but when we reflect we see that their knowledge may only have been very elementary indeed, and that to do all that we have evidence that they did, they need not have had more astronomical knowledge than is possessed by every peasant in the less civilised parts of Europe, who understands that the sun rises and sets at different points in summer and winter, and who can tell the time of night by the stars.

When these people first arrived at Zimbabwe, they found that it was necessary to have some means of determining the seasons of the year and they would almost immediately discover, if they had not brought the knowledge with them from their parent country, that the sun rose and set on different points of the horizon at different periods of the year, and that it rose at the same point at the same period of each year. Naturally they would then fix the extreme points of the sun's journey on the horizon, the southern and northern solstices, and then they would learn to subdivide the distance between these two points, and so would have their calendar.

These temples are of special interest, as they supply us with the only known instance of orientation in the southern hemisphere, where the conditions of solstitial orientation are the reverse of what they are in the northern hemisphere.

The New Lake in the Colorado Desert, California.

By JACQUES W. REDWAY, Esq.

LAKES are the most transitory features of the landscape. Orographic and other secular features are greatly modified by telluric moisture it is true, but rarely are they effaced. But as time is measured in geological science the period of existence of a lake is almost ephemeral. It is formed and again disappears with the slightest change in the amount of rainfall, or, perhaps, because of an almost insignificant change in the elevation of some part of its basin. A slight increase of precipitation filled the lake-beds of the Great Basin until their contained waters were 1000 feet deep, while a diminution of rainfall caused all but a few of the larger ones to disappear entirely. The elevation of the heights of land is thought to have ponded the waters of Saskatchewan, forming Lake Winnipeg; a similar change in elevation drained Lake Agassiz. Moreover, as Gilbert has aptly expressed it:—"Rivers are the mortal enemies of lakes." The stream that flows into a lake fills its basin with the silt brought down from eroded slopes; the stream that flows from its foot, little by little cuts down the rim of its basin and drains it. So insidiously and yet so unfailingly do these processes go on that the discovery of a buried lake-basin, once a source of wonder to the geologist, is now regarded with comparatively little interest. And so often in the physiographical history of the earth has the genesis and burial of a lake occurred, that but few parts of the northern hemisphere are free from lacustrine deposits.

The recently formed lake in that part of southern California known as the Colorado Desert has aroused a momentary interest in this region. A narrow strip along the Colorado river excepted, the south-eastern portion of the state is situated in the Great Basin. Roughly described, this basin lies between the Wasatch Mountains on the east, and the lofty Sierra Nevada cordillera on the west. It is triangular in shape, and the apex of the triangle extends into the Mexican territory. The northern part is a plateau of moderate elevation traversed by a few ridges whose crests precipitate enough moisture to feed the few mountain streams and occasionally to send a flood of water into the dry washes below. The southern part

is much lower, and embraces a depression estimated between 2500 and 10,000 square miles, the greater part of whose surface is below sea-level. The whole extent of the basin is dotted with playa lakes. Those of the northern part are, in the main, shrunken remnants of the two great lakes Bonneville and La Bontau, whose waters in former times covered an area nearly as great as that of Lake Superior. A few of the deeper sinks of these old lakes have always remained partly filled, and their waters are now saturated brines—salt or alkaline according to the constituents of the soil about them. One of these, Owen's Lake, is far enough south to be shown on the accompanying map. A large number of these remnants dried up, however, and their saline deposits were covered with the light pulverulent soil which the famous "Washoe Zephyrs" bear in overwhelming clouds. Finally, the sinks began to refill, and the lakes having been born again, their waters are now comparatively fresh.

The numerous dry lake-beds shown on the map will probably be the first feature to arrest attention. Many of them are situated at the eastern foot of the range that separates the basin from the Pacific slope. During the rainy season of the Pacific Coast region, enough of the precipitation is carried beyond the crest of this range to form a few short-lived streams and these flow into the desert below. Sometimes there is a volume sufficient to spread over a considerable surface, thereby creating an ephemeral playa lake, but usually the stream is quickly swallowed by the burning sands, or licked up by winds that, in temperature, rival a furnace-blast. Mojave River is a noteworthy type of this sort of stream. Its torrential part is nowise different from any other mountain stream. Ordinarily its flood reaches only a short distance beyond the foot of the steeper slope, but in seasons of unusual rain it flows many miles into the desert, filling one sink after another, until its waters are finally lost in Mojave Sink, a depression of considerable size situated 100 miles from the source of the river. The filling of the sink is an unusual occurrence, however, and the lower part of the marsh as well as the sink itself may not have been filled half a dozen times since they were formed.

There are several sinks farther to the eastward that, at the present time, are highly interesting because they have been formed in the same manner as the lake which is the subject of this paper. They are, in fact, nothing more than overflows of the Colorado river. From Yuma, a distance of 50 miles or more above and below the river-bed is considerably higher than the land to the westward, in some places more than 400 feet. So, when the spring floods of the river occur and the channel is running more than bank full, the overflow must of necessity take place on the west side. Practically at this place the Colorado is a river flowing around the side of a hill. Of the various dry lakes shown on the map a few are probably correctly charted as to size and position, others have been reported by prospectors and surveyors, and their size and position are only approximately known. One of the two lying north of Yuma the writer has located from personal knowledge; the other he has never seen, but infers its existence from a broad, well-defined wash that he has repeatedly crossed. As a matter of fact, there are a score or more of similar washes along the west bank of the river, and it is by no means unlikely that some time or other, each has carried a volume of water sufficient to form a sink of considerable size. The stream marked New River is a wash of this character. It does not flow into Colorado River; on the contrary it rises there. Since the time of its development from an insignificant wash a few years since, a number of atlases have persistently shown this stream as rising on the eastern slope of the divide and flowing towards the sink of the San Felipe—this, notwithstanding

the fact that the stream and its origin have been repeatedly described. The location of its beginning is imperfectly shown on the map. At the time of its formation there were several breaks through which the water poured, two of them being crevasses of considerable width. At the present time one of these, about 14 miles distant from Yuma, receives the greater part of the volume of water. The lower part of the stream is also indefinitely located. It has not been surveyed, and on the Land Office map, the only official publication in which it appears, its course has been plotted by description and not by actual survey. It is by no means certain that the stream had ever pushed its way so far as the sink of the San Felipe until this year. It had undoubtedly poured a considerable volume of water into the desert on several occasions—notably in 1862—but inasmuch as the overflow had no great depth of channel and lacked the velocity necessary to cut the latter deeper, the supply of water was shut off when the level in the main river fell to its normal height. New River was therefore a creation of a day—a mere swale, in fact. During a few days of the year it might pour an angry flood into the lower land to the westward and then the water would quickly disappear.

In July of 1891, however, the conditions of its existence were materially changed. Owing to a silting of the channel of the Colorado, about fifteen miles below Yuma, the axis of the current was thrown strongly against the west bank of the river,* and, with the coming of high water, the overflow into New River received an impetus it had never before possessed. Its volume was strengthened and the channel was therefore deepened. With the current of the main river setting directly towards the break, it became a question of time only, until the river itself should be diverted, and by the close of another season of high water, it is not improbable that its whole volume will be turned into the desert through New River. Early in September, a number of Cocopah Indian scouts who were sent to find the location of the break, reported that considerably more than half the current was flowing into New River; and since that time the engineers of the Southern Pacific Railway have reported the volume diverted to be perceptibly increasing. From the break to the head of the gulf the fall is about 135 feet: to the site of the new lake it is 400 feet. Under the circumstances, therefore, it is hardly a matter of wonder that the Colorado should choose the steeper gradient at the first opportunity. Heretofore it is probable that no such volume of water has ever poured into the desert, although there are traditions of a similar inundation about one hundred and twenty years ago.† It is doubtful, too, if New River channel had ever extended so far north-west by twenty miles. This season, however, the crevasses were so extensive—and there were several of them—that the water accumulated until it overflowed all barriers that may have heretofore separated it from the sink of the San Felipe. Then it gradually began to fill the latter, and so the sink became Salton Lake.

Let us now for a moment consider the depression into which the river flows. A glance at the map shows that the two depressions, Death Valley and Coahuilla Valley, are in line with the Gulf of California. The ocean level contours are only approximately shown, for there have been no topographical surveys to show them exactly. The map therefore shows a truth rather than the truth. At King's Springs, Death Valley is 225 feet below sea-level; at its lowest part Coahuilla Valley is about 800 feet below. In a former and not greatly remote period, as geological times are measured, this region was an arm of the sea; it was, in fact, the upper

* I am indebted to Dr. P. G. Cotter, of Yuma, for this information.—J. W. B.

† This was reported by Captain Aum in 1774; a very noteworthy overflow occurred also in 1862.

every six feet in depth there will be precipitated a layer of silt half an inch in depth. When the current begins to slacken because of a lessened slope, the silt little by little is dropped, and because the water cannot hold it in suspension the current must flow around it. So, year by year, the river dropped its burden of sediment, until by-and-by it had built a barrier clear across the gulf. Since that time it is probable that the river has poured its flood into the gulf the greater part of the time. That there have been times in which it flowed into the northern half seems probable also, for all the marginal deposits are lacustrine and not marine. These two depressions are situated in a region called in the northern part the Mojave, in the southern the Colorado Desert. The character of the country does not belie its name, for if ever there was a typical desert, this is one. Traditions have thrown a glamour of mystery about it, and its unusual climate and topography have conspired to make it a region of extraordinary interest. It was here that Mr. Joaquim Miller found the hulk of an abandoned ferry-boat which his active imagination wrought into an argonaut of pre-historic times; it was a part of this region, too, that an over-sanguine army surgeon proposed to convert into an open sea by means of a ditch from the gulf. A few sober figures from General Stoneman, since then Governor of California, cast an eternal cloud over the vision of a new Mediterranean Sea; a column of withering satire from the pen of Major Horace Bell, an attorney of Los Angeles, buried the embryo argonaut too deep for hope of future resurrection.

Except the few isolated spots where water is found at the surface, the entire region is one of indescribable desolation. The surface is covered with a pulverulent detritus formed by the disintegration of felspathic rock and sandstones. The vegetation is comprised in a few species of yucca, cactus, and palm. In the southern part even these are lifeless and bleached a pale yellow by the scorching blasts. The temperature of summer rivals that of the infernal regions. For weeks at a time the thermometer oscillates between 100° and 125°, while in the midday sun it registers 145°. The rainfall rarely exceeds two or three inches a year, and whenever precipitation occurs it nearly always comes in the form of cloud-bursts. There is a sudden darkening of the sky, a tumultuous downpour of water, and the sun is again licking up the moisture from the almost hissing sand. One may appreciate the extraordinary display of solar energy exhibited here in the fact, that when the water first appeared at the Salton Salt-works, its temperature was above 100°. The percentage of atmospheric humidity is equally abnormal, it rarely exceeds 50°, and for months at a time may not exceed 25°.

Under such extraordinary conditions of temperature and humidity it might be inferred that the rate of evaporation is unusually great, and this, indeed, is the case. Even in bodies of water of considerable depth, the rate is not far from half an inch a day, while in shallow pools it is very much greater. On an area of 8000 square miles which the overflow might possibly cover, the loss by evaporation alone might exceed 9 billion cubic feet per day, making no allowance for loss by percolation. In midsummer it is doubtful if the river carries an amount so great as this. In fact, it is doubtful if under the most favourable circumstances the whole volume of the Colorado would fill that part of the depression below sea-level; it certainly would not fill a basin whose datum plane is the level of Yuma.

The future of the new lake is problematic. If the rim or barrier that separates it from the ocean is a high one, the surface of the lake may be enlarged until the volume of the inflow is balanced by evaporation. But the only barrier between the lake and the sea is the result of wolian agencies, and consists of light felspathic dust. The clearing of this detritus, although at times bordering on the marvellous, is very transitory. A drift 25 or 30 feet high may be

formed in a few days, it is true, but it can be as easily swept away. Moreover, it is hardly probable that any continuous barrier of considerable height could have been thrown across the depression since the old gulf was cut in twain. From trustworthy sources it has been reported that the surface of the lake was three inches lower in October than at the time of its maximum height. This shrinkage is due to evaporation and not to any outflow. The coming of another season of high water will undoubtedly raise the surface-level of the lake if the break in the banks is not closed. So the possibilities of a new outlet to the gulf are by no means out of consideration, but such a thing is not likely to take place until a time of unusually high water in the river; it may occur in one year, it may not happen in twenty.

*Discovery of the Galapagos Islands.**

It has not hitherto been known to English readers when or by whom the Galapagos Islands were discovered. We are usually told, as a conjecture, that they were discovered by Spaniards at some time in the early part of the sixteenth century. As geographical students in Spain have been in possession of detailed information on this subject for some time, the publication of an interesting little pamphlet at Madrid, by Don Marcos Jimenez de la Espada,† seems a fitting occasion for placing the facts he records in possession of English geographers.

The group, now known as the Galapagos Islands, was discovered by an Inca of Peru, named Tupac Yupanqui, who flourished towards the end of the fifteenth century, and was the grandfather of Atahualpa. After the conquest of Quito he collected a large fleet of balsas on the coast of the province of Manta, put to sea, and discovered two islands, which he named Nina-chumpi and Hahua-chumpi. *Chumpi* means a girle or encircled space in Quichua, hence an island. *Nina* means fire, and *Hahua* outside. The Fire Island and the Outer Island = Albemarle and Narborough Islands it is supposed. With regard to Nina-chumpi, there is later evidence of the activity of Galapagos volcanoes. In 1546 smoke was seen issuing from a crater. Darwin saw a small jet of smoke issuing from the summit of one of the craters in 1838; and eruptions were recorded on Narborough Island in 1814 and 1825.‡ Our authorities for this Inca discovery are, Sarmiento, the first surveyor of the Straits of Magellan, and Miguel Cabello de Balboa, in his '*Miscelanea Austral*' (1590).

Señor Vidal Gormaz, the Chilean hydrographer, in an article on the Galapagos in the '*Anuario Hidrografico de la Marina de Chile*' (1890), says that the early Spanish discoverers called the Galapagos "the Enchanted Islands," but he gives no authority for the statement.

The Spanish discoverer of the Galapagos Islands was a bishop. Fray Tomas de Berlanga, the Bishop of Castilla del Oro, was charged by the Emperor Charles V. with a mission to visit Peru, and report upon the government of Pizarro. He sailed from Panama on the 23rd of February, 1535. For seven days there were favourable breezes, but after eight succeeding days of calm, during which the vessel was drifted far out to sea, the bishop and his people were reduced to great extremities for want of water, and there were several horses on board. On the 10th of March, 1535, an island was sighted, and next day another, with lofty mountains. The vessel was becalmed for three days between them, all the people suffering terribly from thirst. At last they landed, and searched for water without success for two

* By O. R. Markham, Esq., C.B., F.R.S.

† '*Las Islas de los Galapagos por Marcos Jimenez de la Espada*,' 1892.

‡ '*Anuario Hidrografico de Chile*,' 1890, p. 396.

days. The only relief they could get was by chewing the stalks of a large cactus. On the Sunday the bishop said mass on shore, and afterwards the people wandered away by twos and threes. One party at length found water in a ravine, and they were able to fill all the barrels and jars. But one man and two horses had already died of thirst. The bishop described the great masses of volcanic stones on the beaches. "It looked," he said, "as if God, at some time, had rained stones." He mentioned the *galapagos* or great land tortoises that could carry men on their backs, the iguanas, and numerous birds. He got a very good observation for latitude, and found it to be $0^{\circ} 30' S$.

In returning to the South American coast the bishop and his crew were eleven days without seeing land, and at the end of that time they only had one cask of water left. Half was kept for the horses and the other half was mixed with wine. At length land was sighted, but there were two days of calm, and, although they were cheered by the sight of land, they had no water left, and could only drink wine. They arrived safely at Puerto Viejo, near the place where the Inca, Tupac Yupanqui, had embarked on his voyage of discovery about sixty years before, on the 9th of April, 1535.

Bishop Berlanga gave an account of his discovery to the Emperor Charles V. in a letter dated April 26th. The original is preserved in the 'Archivo de Indias,' and there is a copy in the great collection of Muñoz (tom. lxxx. p. 92). It is printed in the 'Coleccion de documentos ineditos de Indias,' tom. xli. pp. 538-544.

The second visit to the Galapagos Islands was made in 1548. When Diego Centeno was defeated in the south of Peru by Carbajal, the fierce old lieutenant of Gonzalo Pizarro, he sent an officer to the coast, named Diego de Rivadeneira, to secure a vessel for him in which to escape; but Rivadeneira fearing that Carbajal was chasing him, got on board a little vessel at Arica, and sailed away without waiting for Centeno. He had about a dozen soldiers with him. In April 1546, twenty-five days after leaving Arica, they sighted some islands, and saw smoke rising from a mountain peak. They landed to seek for water, and resumed their voyage to Central America, suffering terribly from want of water and food. They lived on sharks, caught with fish-gigs made out of their own spurs, and Rivadeneira and his followers arrived at San José de Istapa, in Guatemala, nearly famished.

The President, Pedro de la Gasca, wrote an account of this visit to the Galapagos to the Council of the Indies in a letter dated May 2nd, 1549 ('Coleccion de documentos ineditos,' tom. l. p. 50), and Francisco de Castellanos, the Treasurer of Guatemala, made a report of it to the Emperor on August 26th, 1546. There is also an account of the voyage of Rivadeneira in the 'Guerra de Quito,' by Cieza de Leon, first printed in the 'Biblioteca Hispano-Ultramarina' in 1877.

The first survey of the Galapagos Islands appears to have been made by Ambrose Cowley in 1684. He accompanied the buccaners Cook, Davis, and Dampier in that year. In 1793 a Spanish survey was executed by Don Alonzo de Torres y Guerra, captain of the frigate *Santa Gertrudis*, on his way from Nootka Sound to Callao. The resulting chart is preserved in the Hydrographical Department at Madrid, and Don Marcos Jimenez de la Espada has printed it for the first time in his pamphlet. The Spanish names of the islands are as follows:—

Torres, 1793.		Cowley, 1684.
Santa Gertrudis	.. ..	Albemarle Island and Narborough.
Guerra	.. ..	Lord Culpeper Island.
Nubez	.. ..	Lord Wenman "
Carlos IV.	.. ..	Earl of Abingdon "
Torres	.. ..	Bindloe "
Gil	.. ..	King James "
Valdes	.. ..	Indefatigable "
Quitavueno	.. ..	Tower "

The Government of Ecuador intends to change the names of the islands in the Galapagos group to commemorate the fourth centenary of the discovery of the new world. In that case the Nina-chumpi and Hahua-chumpi of the Inca certainly have the best right to a place in the new nomenclature. The names of Cowley precede those of Torres by more than a century.

GEOGRAPHICAL NOTES.

The Royal Medals and other Awards.—The Royal Medals of the year for the encouragement of geographical science and discovery have been awarded by the Council of the Society as follows:—The Founder's Medal to Mr. Alfred Russel Wallace, the well-known naturalist and traveller in the tropics of both hemispheres, and co-discoverer with Charles Darwin of the Theory of Natural Selection; in recognition of the high geographical value of his great works, 'The Geographical Distribution of Animals,' 'Island Life,' and 'The Malay Archipelago.' The Patron's or Victoria Medal to Mr. Edward Whymper, for the results of his journey in 1879-80, recorded in his work 'Travels among the Great Andes of the Equator,' published in 1892. Mr. Whymper has largely corrected and added to our geographical and physical knowledge of the mountain systems of Ecuador. Appended to his book is a route-map, extending over 250 miles, and fixing the position of all the great Ecuadorian mountains, constructed from original theodolite observations, with a detailed survey of Chimborazo and its glacier system. Mr. Whymper also made a series of careful observations on the action of low pressures on the human frame. The Murchison Grant has been awarded to Mr. M. W. Robert Swan, surveyor and geologist, who accompanied Mr. Bent in his expedition to Mashonaland, making a careful route-map of the country traversed down to the East Coast at Beira; his observations have materially altered the cartography of the region. The Back Premium to the Rev. James Sibree, jun., for his many years' work on the geography and bibliography of Madagascar. The Cuthbert Peek Grant to Mr. Charles W. Campbell, for his important journeys in Korea. The Gill Memorial to Mr. G. H. Garrett, for important geographical work done during the past fifteen years in Sierra Leone. The three Honorary Corresponding Members chosen are:—General Shdanof, head of the Caucasian Survey, Tiflis; Dr. Don Luis Cartanza, President of the Peruvian Geographical Society; and Dr. A. Supan, editor of 'Petermann's Mittheilungen' and one of the editors of the 'Geographisches Jahrbuch.'

The Lectureship in Geography at Owen's College, Manchester.—Mr. H. Yule Oldham, M.A., has been appointed to the newly founded Lectureship in Geography, at Owen's College, Manchester. The salary of the chair is provided jointly by the Royal Geographical Society and the Manchester Geographical Society. Mr. Oldham is a nephew of the

late Sir Henry Yule, and has studied for some time under Baron von Richthofen.

Celebration of the Fourth Centenary of the Discovery of America by Columbus.—In October next there will be two Congresses held in Spain in celebration of the fourth centenary of the discovery of America by Columbus. One of these is under the auspices of the Geographical Society of Madrid, and will be held in Madrid. The other is the Ninth International Congress of Americanists, the proceedings of which will deal mainly with the momentous event that took place in October, 400 years ago. This Congress will meet in the Convent of Santa Maria de la Rabida, near Huelva. In the same month a Congress will be held at Genoa in celebration of the event. Exhibitions will be held in connection with all three congresses. The Council have appointed the following gentlemen as delegates to represent the Society at these congresses:—Sir George F. Bowen, *c.c.m.g.*; Mr. Clements R. Markham *c.n.*, *f.r.s.*; Dr. R. N. Cust; and Mr. E. Delmar Morgan.

The Influence of Physical Geography upon the Displacement of Population in England and France.—M. E. Levasseur, of the Institute of France, made some observations at a recent meeting of the Geographical Society of Paris upon the displacement of population in England and France as revealed by the latest statistics. Similar demographical phenomena are taking place in both countries. This similarity is partly accounted for by a kind of symmetry in their physical geography and especially in their geology. In France there is the Parisian basin surrounded by ranges of ancient rocks, granites, schists, and jurassic rocks, the Ardennes in the north-east, the Vosges in the east, the central massif of France in the south, Brittany with Maine and Cotentin in the south-west. In the middle of the envelope of rocks, the concentric rings of sedimentary rocks are developed; first, at the periphery and foot of the ancient massifs, the jurassic rocks; secondly, the cretaceous and thirdly, the tertiary. Speaking generally, the region of the ancient rocks is more mountainous and less fertile, while that of the sedimentary and tertiary rocks possesses more plains and is richer in cultivation. The presence of coal, however, modifies these conditions. France does not possess the whole of the geological circles of the Paris basin; it has only the arcs of which the littoral of the Channel forms the chord. But in England the arcs, symmetrically arranged, very nearly complete the circles. The arcs of the periphery rest, as in France, on the ancient massifs of Cornwall, Wales, and the Scottish border. The history of invasions teaches us that this physical constitution of the two countries has not been without its influence upon the composition of their population; the earlier settlers being gradually driven outwards from the central plains of the geological basins to the mountains on the edge. But in modern times, owing to economic conditions there has been a

movement of population from the periphery towards the basin of which London may be regarded as the centre and which is the complement of the Paris basin. There is more displacement of population in England than in France. According to the French census of 1886, 81 per cent. of the inhabitants were living in the department in which they were born, while the English census of 1881 showed only 74 per cent. as living in the county where they were born. Speaking of the comparative rate of increase of population in the two countries M. Levasseur pointed out that in France there was in the year 1328 a population of say 21,000,000, and in 1891 of 38,343,000, or an increase of 81 per cent., whereas in England and Wales in the year 1377 the population was 2,350,000, and in 1891, 29,000,000, or an increase of 1134 per cent.

The Structure of the Vosges Mountains.—In a communication addressed to the Geographical Society of Paris, and published in the 'Compte Rendu' of the 4th December last, M. Irénée Chiron propounds a new theory with reference to the structure of the Vosges Mountains. According to the theory hitherto generally accepted by geologists, the Vosges and the Black Forest ranges formed originally one single *ma-sif*, running in a north and south direction, with ramifications to the east and west, the valley of the Rhine, which now separates them, being the result of a geological subsidence. M. Chiron, however, sees in the Vosges, not one principal chain, but a series of parallel ranges, with a south-west to north-east direction. The nature of the rocks and the existence of intervening valleys leads him to divide the Vosges into four systems, in each of which one or more chains follow each other with the orientation just mentioned. These systems are determined by (1) the first zone of primary rocks, (2) the zone of the granites, (3) the zone of the crystalline schists, and (4) the second zone of primary rocks. The connection between the Vosges and Black Forest mountains is sufficiently obvious, but M. Chiron regards the latter simply as a continuation of the former in more or less parallel ranges like the Vosges. According to him the valley of the Rhine was caused by the descent of waters in pre-historic times from the Alps and the Jura, forcing a passage through the mountains, which was subsequently deepened by erosion. M. Chiron refers to the map in Schrader's atlas, as giving, in his opinion, a fair idea of the geography of the Vosges. In the 'Compte Rendu' of the 22nd January appear some observations made by M. A. de Lapparent, in reply to M. Chiron's paper. The question is one for geologists to decide, but it is also of interest to geographers.

Recent Fluctuations in the Level of Lake Aral.—In a paper 'On variations of *Cardium edule*, apparently correlated to the conditions of life,' Mr. William Bateson ('Phil. Trans.,' 189 B., p. 297, 1899) gives some

observations of considerable geographical interest bearing on the desiccation of Lake Aral. The author visited the Lake Aral region in 1886 and 1887 as a naturalist, and the conclusions in the present paper are mainly derived from a study of the distribution of the shells of the Aral cockle. The fauna of Lake Balkhash was found to negative the supposition that the Quaternary Aralo-Caspian Sea extended eastward to include that lake. Cockle-shells are found in enormous profusion along the shores of Lake Aral, in some instances to a distance as great as 15 miles, but it is remarkable that this wide distribution occurs only on the lowest part of the Karakum. The northern shore of the lake is a line of high cliffs of horizontally bedded Eocene rocks, and there the belt of shell-strewn land is very narrow. At no point does the deposit of shells extend to a greater altitude than 15 feet above the present level of the lake, and at that elevation the shells suddenly cease. The sharpness of this vertical boundary makes it impossible to suppose that shells once deposited above it have been removed by denudation. From the abundance of cockles in Lake Aral, and the immense numbers which are stranded every time an on-shore wind floods the low margins, it is impossible to believe that the water of the sea has in recent geological times spread over these shell-less regions. The comparative permanence of the water surface is emphasised by the fact that no Aral shells are found in Lake Chalkar, at the end of the valleys of the Irghiz and Turgai rivers. The Karakum, stretching to the north of Lake Aral, is entirely free from the shells of *Cardium edule* except in the depressed channels which lead from the sea to the saline hollows of Jaksi Klich and Shumish Kul. In the latter basin (known as Khan Sultan on the Russian maps), the evidence of desiccation is very clear. The margin of the basin is an undulating tract of sand bearing scanty vegetation, below which is a stretch of baked mud surrounding the pan of salt which occupies the deepest part of the hollow. The western edge of the basin is steep, and bears a series of terraces marking stages in the desiccation of the lake. The shells of the same species on each terrace show remarkable progressive modifications, which, in the opinion of the author, are due to changes in the environment, and in particular to the increase in salinity and in range of temperature, brought about by evaporation. Observations on the lakes of the Nile Delta confirm this conclusion, and if it be finally substantiated, a new instrument for the elucidation of pre-historic topography will be placed in the hands of geographers.

Captain Bower's Journey across Tibet.—The journey of Captain Bower (already known for his explorations in the Pamir and on the northern frontiers of India) across the widest expanse of the Tibetan plateau, from Ladak in the east towards Chiamdo in the west, has been happily planned so as to traverse one of the most important of the hitherto unexplored areas in that country. From the telegram dated the 25th April, of the Calcutta correspondent of the *Times*, we learn that Captain Bower and Dr. Thorold started from Leh on June 14th, 1891, and crossed

into independent Tibet by the Lanak-la Pass, following apparently the same route as that taken by Mr. A. D. Carey in 1885, as far as $80^{\circ} 40'$ E. longitude. At this point or thereabouts Captain Bower struck eastward with a slight southing, eventually emerging into known regions on the northern shore of Lake Tengri Nor. From the scanty telegraphic information to hand it would seem that the route lay at first roughly parallel to that of the Pundit Nain Singh in 1874, and distant therefrom northward about 150 miles. Here Captain Bower passed a chain of salt lakes, one of which, called Hor-Da-tu (? Hor-pa-chu), is described as being probably the highest lake in the world, and 17,930 feet above sea-level. This indicates a line of country similar to the lacustrine plateau southward, explored by Nain Singh. A magnificent snowy range was seen stretching away on the north with a lofty peak in longitude 83° E. and latitude 35° S. This peak is probably to be identified with the Taa-taa mountain of the Chinese map quoted by M. Dutreuil de Rhins (see p. 573 of his book and sheet 13 of his map), while the mountain range may very possibly be the same as that drawn, tentatively, on M. Bonvalot's map, and connecting his Dupleix Mountain with the mountains south of Keria, and, traced with rather more precision, on Dr. Georg Wegener's map of the Kwen-lun system (see 'Zeitschrift' of the Berlin Geographical Society, No. 3 of 1891). After many weeks' travel over uplands exceeding 15,000 feet in height, where water was scarce and no inhabitants were to be seen, the party on September 3rd reached Gya-ku Liuching (Ngya-chu Lho-zang of the Pundit Nain Singh), on the north-eastern shore of Lake Tengri Nor, where their route joins those of Nain Singh and Bonvalot. Before reaching this point, Captain Bower probably passed the great Chagut Cho Lake mentioned by the Pundit, as draining into the Nag-chu-ka river, the further course of which is generally supposed to be identical with the Salween. At Tengri Nor, Captain Bower and his party were met by two Tibetan officials sent by the Governor of Lhasa, and were ordered to return by the way they had come by. But, like M. Bonvalot who was placed in a similar predicament in about the same spot, the Englishmen refused to return and eventually a compromise was effected, guides and ponies being provided, on their agreeing to make a detour to the north on their way to Western China. Apparently (for details are wanting) Captain Bower's party followed beyond this point a somewhat more northern route than that of Bonvalot, but, unlike the French traveller, who was careful to avoid Tsamdo for fear of exciting the fanaticism of the Chinese inhabitants, they visited the town, and were duly threatened by the monks, who were only kept off by the knowledge that the party carried breech-loaders. From Tsamdo, which is situated on the upper Mekong, Captain Bower intended to have struck southward to Upper Burma, a piece of exploration which would have shed a most interesting light on the courses of the Salween and Mekong, where they traverse a very obscure country, but the rumour that 200 Europeans were at Tarchendo or Ta-tsien-lu induced him to strike eastward towards that town. This was probably a fortunate change of plans, as the party might have been cut up by Kachins, who have been particularly hostile to our troops during the last few months, had it attempted to descend on Upper Burma from the north. From Tarchendo he proceeded to the Yungtee-kiang and arrived at Shanghai on March 29th. It is no surprise to learn that the Chinese passports with which the party were furnished did not avail to secure them permission to proceed to Lhasa, for all recent travellers have fared similarly in their attempts to reach the Tibetan capital. So far as one can gather, the statement that Captain Bower traversed between Lanak-la and Tarchendo over 2000 miles of practically new ground is quite credible, and his report and maps, on which he is now engaged, will probably reveal some of the most interesting problems of Tibetan topography and hydrography, particularly that relating to the drainage of the vast inland lacustrine plateau.

A New Mountain Range in Benin.—His Excellency Gilbert T. Carter, Governor of Lagos, sends the following interesting communication on a recent journey into the interior:—"It may be interesting to the Society to hear of the discovery of what I believe to be a new range of mountains in a little-known portion of West Africa. I have recently returned from an expedition of a month's duration to Ondo and Ilesha, two independent countries occupied by offshoots from the great Yoruba race, and speaking a dialect of the Yoruba language. Both these countries may be said to consist of a vast forest abounding in rocky hills, mostly covered with timber, but now and again one meets with a gigantic mass of solid granite too smooth, at least in its more elevated portions, to retain sufficient soil to start the germs of vegetation. These rocky hills are for the most part inaccessible, and consequently in travelling through the country it is not easy to determine its physical conformation. I was, however, able to get up to the top of one of these hills in the neighbourhood of Ode Ondo, accompanied by Mr. George Shallard, the Queen's Advocate, of Lagos. From its summit we saw one of the finest views I have ever witnessed in West Africa, and I am well acquainted with all the British colonies from Gambia to Lagos. Unfortunately, we could not get a complete view of the surrounding country, as there was a higher rocky eminence which shut out the prospect to the north and west; but bearing about south-east of our position, and at a distance of about twenty miles a fine range of mountains was plainly visible, nothing but rock was perceptible, although the lower slopes doubtless were covered with timber. In the immediate foreground there were a series of rocky and wooded hills, piled together in irregular, but picturesque confusion, and with the mountains in the distance formed a sight that I shall never forget. I should judge the higher peaks to be from 5000 to 8000 feet above sea-level. The top of the hill from whence the view was obtained was about 1000 feet from sea-level. On my arrival at Ode Ondo I inquired of Mr. Phillips, an intelligent native missionary, whether he knew anything of the mountains in question, and he informed me that he had never seen them, but that probably they were in the Adaura country, situated about six hours in a south-easterly direction from Ode Ondo (this would be about 18 miles). He mentioned that the principal town of the Adauras was on a hill, and that the natives required ladders to get to their houses. I much regret that matters of urgency required my early return to Lagos, otherwise I should certainly have visited Adaura; however, I trust it may be possible to do so later on. The only map accessible to me, giving any details of Ondo and Ilesha, is attached to a Blue Book 'In continuation of [C.—4957] February, 1887,' and in itself is numbered C.—5144. This map is necessarily very imperfect, and my route from Ondo to Ilesha was taken by a more direct track than that through Ife, traversed by the Commissioners. I found the source of the Oluwa river to be

close to the town of Ode Ondo, and not in the Ilesha country, as supposed in the map. The Oluwa, which is a considerable stream in its lower part, owes its volume to a number of tributary streams flowing into it. The river supposed to be the Oluwa is evidently the Oni, which is reported to be of considerable size at Oke Igbo, and to contain numbers of hippopotami and crocodiles. I endeavoured to get a view of the mountains from the top of a hill near Ode Ondo, and induced Mr. Phillips to accompany Mr. Shallard and myself, but after an hour of the hardest work I think I ever did we had to give it up. First, we had to penetrate a belt of forest with enormous boulders and a dense undergrowth; at the end of this we discerned a wall of granite almost perpendicular, and there appeared no means of either ascending or circumventing it from that side, so I reluctantly gave up the undertaking."

Exploration on the Oil Rivers.—Captain H. A. Gallway, Vice-Consul for the Oil Rivers Protectorate, has succeeded in tracing the Benin river to its source near Lapoba. Up to Eku he travelled in a launch drawing five feet, but beyond that in a canoe. Only one white man is known to have penetrated so far in this direction previously, and Captain Gallway has mapped the river for the first time, although the want of instruments seriously hampered him in the work. Contrary to advice he travelled unarmed, and was gratified by a very warm welcome from the natives he encountered all the way to Uria in the heart of the Abirakar country. In December last, Captain Gallway performed another journey of still greater interest, and attained the distinction of being the first European to thread a way through the interlacing creeks of the delta-land between Benin and Lagos. Previous attempts made from the side of Lagos only succeeded in tracing a waterway as far as Arogo. The whole journey of 160 miles occupied five days, the vessel employed being a gig-canoe, paddled by twenty-four natives.

Some Notes on the Victoria Nyanza.—The following observations on the Victoria Nyanza have been sent by Mr. Ernest Gedge, who has spent a considerable time on the lake and in its neighbourhood:—"The appearance of the lake suggests the formation at some remote period of a vast trough or valley; the western coasts give striking indications of this, especially in Karagwé, where the cliffs come sheer down with deep water close in shore. Inland, behind these, can be noticed a succession of lines of fault, running parallel to one another, forming a series of terraces or steps, which finally culminate in the high grassy plateaus stretching away westwards. There is nothing either on this side or on its southern shores suggesting volcanic action; the geological structure consisting for the most part of gneissic formations and schists, with enormous boulders of porphyritic granite, the latter constituting the most prominent feature on its southern coasts, as well as forming a remarkable island in the lake, known as the "Makoko" or white rocks. On the northern shore outcrops of honey-combed iron stone and lava blocks are to be seen, and this change in the geological structure is accompanied by a corresponding change in the vegetation, from the sterile arid wastes so characteristic of the southern coasts, to rich tropical growth. The main visible sources of the water supply for this great reservoir are the Kagera, Nzoia, and Ngure Darash rivers; and these,

though continually discharging a certain amount of water into the lake, are of no great size, except during the rainy season, appearing totally inadequate to maintain the equilibrium of the lake, when we consider the volume of water constantly being carried off by the Nile, as well as the loss that must be caused by evaporation from so large an area. This would lead one to suggest the existence of springs to make up the deficiency. The lake is of great depth in places, and the water fresh and clear, though flat and insipid to drink. Fish are plentiful, being mostly caught with a rod and line, the nearest approach to netting being a screen of grass mats, used as a sieve by the people in Lower Kavirondo, and the basket traps used by the Ba-Sesse. Amongst others is a *Silurus*, which has evidently been mistaken for the porpoise, owing to its shiny black body, and its habit of coming to the surface and indulging in porpoise-like gambols in calm weather. Hippopotami are not very plentiful, as they chiefly confine themselves to the coasts and rivers. Those that are found in the open water are however extremely vicious and much feared by the Ba-Sesse canoe-men, who, strange to say, are unable to swim. This is no doubt largely due to the fact of the lake being infested with alligators, rendering it dangerous for any one to enter the water. Cyclonic storms of great violence occur at certain seasons, and are most dangerous to a small craft. These storms in August usually occur at day-break, coming from the south-west, with much thunder and lightning. Following the coast line for a time, they would suddenly sweep across the lake in a north-east direction, raising a tremendous sea, and on several occasions we were in imminent danger of being swamped. During this month I noticed that about 8 a.m. the wind was invariably off shore, varying from the north-north-east to north and north-west. This would drop about 11 a.m., to be followed by a calm lasting to about 2 p.m., when the wind would again come up and blow strongly, in gradually increasing force, from the south-west to south, dying away again at night about 8 p.m. During November the prevailing wind was from the north-east. One of the most remarkable phenomena I witnessed was the apparent tide observable at irregular intervals, the waves coming in and overflowing the beach in exactly the same way as the tide on the sea shore, the rise and fall lasting from half an hour to an hour or more. This has occurred during a comparative calm on some occasions, whilst on others, though a strong gale has been setting in shore, I have not noticed any difference in the lake's level, so it would seem that this occurrence is not altogether attributable to the wind backing up the water. Another curious feature is the periodical rise and fall which, according to the natives, takes place every 25 years, and which is shown by the water marks on the stones. At the time of my visit the lake was between 8 and 9 feet below high-water mark, and the people told me that certain lands then under cultivation would again be flooded in due season, and that the peninsula on which my camp was pitched would again become an island." Similar changes of level have been noticed, both in Lake Tanganyika and Lake Nyassa, and it is very desirable in the interests of geography as well as the development of the continent that continuous observations should be made, in order to discover what is the real character of these changes.

The Cameroons in 1891.—The 'Deutsches Kolonialblatt' for April 1st contains a report on the progress of the German territory of the Cameroons during 1891. From this it appears that the number of Europeans has increased by 29, and now amounts to 166. Of this number 31 are Englishmen. Statistics of the natives are at present not obtainable. The most important tribes in the Victoria district are the Bakwili, to the east and south-east of the Cameroons mountains, the Bambeke on the west, and the Bakundé on the north. The two first together number about 45,000. The Batu ba Dualla, on the banks of the Cameroons river, are estimated at 20,000. Of the commodities exported during the year we may mention the following:—

palm oil, ivory, ebony, cocoa, coffee, and tobacco; cotton is being experimented with. Fruit of various kinds is grown to a considerable extent in the Victoria district. The exports amounted to 220,000*l.*, the imports to 210,000*l.* The territory possesses an excellent network of trade routes in its rivers, which are navigable to a distance of between 35 and 60 miles from the coast, to the edge of the West African tableland in fact. Besides the numerous streams converging to the Cameroons river we have, further south, the Sannaga navigable for 40 miles to the falls of Ida; beyond this obstacle the river is as yet imperfectly known, but promises to offer a waterway as far inland as Adamawa. The progress of the past year seems on the whole to have been satisfactory, especially in the matter of establishing more intimate commercial relations with the Dnalla. The official staff has been increased, the nucleus of a colonial police force formed, and the revenue increased by the extension of customs control to the southern frontier, and the levying of higher duties throughout the territory.

Subterranean Waters in the Sahara.—The admirable results which have attended the artesian borings in the Wed Rir, at Wargla, and more recently at El Golea in the Sahara, have led to a demand being made by the inhabitants of the Mزاب in the southern part of the French Sahara, for the assistance of the Government in undertaking experimental borings in that region also. M. G. Rolland, one of the few geologists who have explored the Algerian Sahara, and the only one who has visited the extreme south, makes the following observations on the régime of subterranean waters between Laghuat and El Golea. From the north to south in the region of the Laya, and on the chalk plateau which extends to the south, borings have no chance of success. In the shebka of the Mزاب and of Metlili, the conditions are only moderately favourable, and it would be necessary to penetrate down to 700 and even to 1000 feet. To the south of the 32nd parallel the chances of success increase in what M. Rolland calls the shebka of the south of El Haasi. Borings would undoubtedly succeed in the depressions of Dayet Tarfa, El Aref, Zubia, and Bu Fakrun. Further south, springing water would be obtained along the western border of the chalk reliefs, which is unfortunately complicated by the ramifications of the Western Erg, and the depths of the borings would go on decreasing until, on approaching the region of El Golea, it would be necessary to penetrate down only to 400 feet.

Death of M. Duveyrier.—M. Henri Duveyrier, the African explorer, died on the 25th April at Sèvres. He had for some time been a prey to melancholia. Duveyrier was born in 1840. Part of his youth was spent in Germany and in London, where he became acquainted with Barth, who was at that time engaged on the narrative of his travels. After careful preparation he set out, at the age of nineteen, on his journey through the Western Sahara, which extended over nearly three years, during which he added greatly to our knowledge of the region immediately to the south of the Atlas. The first volume of his 'Exploration du Sahara' was published in 1864, and obtained for its author the gold medal of the Paris Geographical Society. He was

prevented from completing the work by the war of 1870, being taken to Germany as a prisoner. Duveyrier contributed numerous valuable papers to the 'Annales des Voyageurs' and the 'Bulletin' of the Paris Geographical Society, and was co-editor of the 'Année Géographique' and the 'Dictionnaire de Géographie Universelle.'

M. L. Dècle's Travels on the Upper Zambezi.—In a letter addressed to the President of the Geographical Society of Paris, M. Dècle gives some account of his journey in the Upper Zambezi region, and of his visit to the Victoria Falls. His letter is dated 20th January, 1892, from Palapye, the capital of King Khama. He had arrived at this point a few days before, after undergoing severe hardships on his march from the Zambezi; On the 6th December he set out from Kazungula, at the junction of the Linyanti and Zambezi, *en route* for the great falls. Instead of taking the usual route which lies along the left bank of the river, he proceeded down the right bank of the stream and explored the series of rapids which lies between Kazungula and the Falls. This route presented considerable difficulties, owing to the dense forest and marshy ground. It was also the rainy season. Game was very plentiful; large herds of antelopes of various kinds approached within 50 yards of the party. Six days were occupied in reaching the Falls, which greatly impressed the traveller. A few days later found him at Pandamatenga, where he was unable, owing to the bad harvest, to obtain sufficient provisions for his march across the Kalahari desert. It was only after great privations, increased by attacks of fever, that the party reached their camp in the desert on the 6th January. At the time of writing, M. Dècle was on the point of starting for Matabele-land.

The Glaciers of Mount St. Elias.—Mr. Israel C. Russell describes, with a map, the results of the Mount St. Elias expeditions of 1890 and 1891 in the 'American Journal of Science' for March. The glacier system of the region is its most interesting feature. The snow-line occurs at an elevation of about 2000 feet above sea-level, and from the vast snow-fields which lie above that level hundreds of glaciers of the Alpine type descend. The Seward Glacier, the largest, is fully fifty miles long and three miles wide in the narrowest part. All the glaciers unite in one immense "Piedmont glacier" called after the early explorer Malaspina. The Malaspina Glacier extends unbroken along the coast for seventy miles west from Yakutat Bay, and has an average width of between twenty and twenty-five miles. It forms a nearly horizontal plateau of about 1500 feet in elevation, and 1500 square miles in area. The centre of this prairie of ice is free from moraines, but moraines spread out from the tributary glaciers on the north, and its southern border is covered with moraine material bearing a strip of pine forest. The expanse is divisible into three lobes, the largest of which is at the base of the Seward Glacier, and flows eastward, melting before reaching Yakutat Bay. The central

lobe, an expansion of the Agassiz Glacier, flows south-west, and the third lobe, containing ice mainly derived from the Guyot Glacier, flows south, and, reaching the sea without melting, breaks off in magnificent ice-cliffs. It is the only glacier in Alaska which advances into the open ocean. The marginal moraine is full of rudely circular lakelets, the crater-like hollow of which is undercut at the base, and as the walls melt immense quantities of boulders and debris accumulate at the bottom. Eventually the lakelets are drained through crevasses and the rubbish remains as a pyramid fifty or sixty feet high, which remains when the general surface of the glacier melts away. The marginal forests grow on the moraine material resting on ice, in many places 1000 feet thick. It would appear that in one instance a cape, reported by Vancouver, has been cut away during the century which has elapsed since his voyage, and the whole forest belt at that point has been removed. The drainage of the Malaspina Glacier is entirely from beneath, the streams emerging from tunnels under the ice, in which the characteristic sand and gravel heaps of coasts are being formed.

Wind-action in the Channel Islands of California.—The prevailing north-westerly summer winds of California sweeping over the islands of San Miguel, Santa Rosa, and the other members of the group known as the Channel Islands, have become much more powerful erosive agents since the islands have been occupied by civilised man. Dr. Gordin Yates points out in the 'American Naturalist,' January 1892, that the succulent plants which formerly bound the sands on the shore have been largely destroyed by sheep; the sand has thus been loosened and drifting across the islands has killed most of the trees and shrubs. The islands are, in consequence, rapidly becoming uninhabitable.

Mr. A. E. Pratt's Expedition across South America.—On April 27th, Mr. A. E. Pratt, whose journeys on the Eastern Borders of Tibet will be remembered,* sailed from Southampton for Para. Mr. Pratt intends to devote between two and three years to a journey across South America, following in the main the less known sections of the Amazon valley. He will cross the Andes to the west coast, but by what route he has not yet determined. He will take up his residence for about a year at a convenient station on the upper Amazon, from which he will make excursions in various directions. Mr. Pratt will be accompanied by Mr. T. M. Teed, a trained and experienced observer, who will have charge of the instruments which have been lent to the expedition by the Society. The Council have made a grant of 100*l.* to Mr. Pratt.

The Resources of Paraguay.—From a report issued last month by the Foreign Office, on the Republic of Paraguay, we extract a few facts of interest from the point of view of commercial geography. It is eight or nine years since the last report was issued on the Republic, so that British traders have not of late years

* 'Proc. R.G.S.,' 1891, p. 329.

received much information with reference to Paraguay from the Foreign Office. There is the usual complaint that while much of the capital employed in this country is British, the actual control of the trade is in the hands of Germans. Of the climate, Mr. Herbert, the writer of the Report, says that it is not unhealthy, and that the frosts and droughts so disastrous in the Argentine are unknown in Paraguay, though the country is too hot for rearing sheep in any numbers. As regards minerals, iron and copper of good quality have been found, but no traces of coal have been discovered. Paraguayan woods are so dense, the average gravity being 70 lbs. per cubic foot, that they cannot be floated in rafts, as in Canada. Some shipments have, however, been made to Europe by way of Buenos Ayres, mostly of cedar. Yerba-maté, or Paraguayan tea, is produced in increasing quantities. The entire production for the present year will not be less than 800,000 arrobas of tea (an arroba is 25 lbs.), and it is calculated that a maximum of 1,000,000 arrobas could be reached. This would give an area of about 1000 square leagues of yerbales, or yerba-producing forests. A textile plant (Caraguata) abounds, and grows naturally in every part of the Paraguayan Republic, and samples of the products have arrived in Europe in good condition; but shipment in bulk has not been successful, as it fermented on the voyage. The fibre is fine, but the cost of cleaning and separating it from the leaves is a barrier to the development of the industry.

Visits to the D'Entrecasteaux and Trobriand Groups, South-east New Guinea.—In a recent despatch, Sir William Macgregor, the Administrator of British New Guinea, gives an account of his visits last summer to the above groups of islands. The first piece of work was a continuation of the inspection of the coast of Fergusson Island from near the village of Nadi. The great mountain mass of Edagwaba, with summits rising to 4000 or 5000 feet, lies immediately inland of Nadi, and forms the greater portion of the south portion of the island, coming right down to the beach from Nadi to Giria Creek. Its formation is micaceous schist, and it is densely wooded, often with pines and palms, on the higher ridges. The great mountain is described as very rough, cut up by deep precipitous ravines, steep and rocky gorges, down which pour numerous small streams. The schist formations meet volcanic hills in the neighbourhood of Giria, and from that point to the Waneta the country is very fruitful, and the population extremely numerous for the area. The volcanic hills of the south-west corner of the island culminate in Nawawara, about 1800 to 2000 feet high. The Abugobi hills, not over 1000 to 1200 feet high, lie between Nawawara and the great mass of Edagwaba. The north-west corner of Fergusson Island is formed by the bulky mass of mountain, Kubioia, which rises to heights of 3000 or 4000 feet. There is a large population on the southern spur of this mountain, with villages and gardens sometimes at an elevation of 1500 feet. The islands of Ilamu, and Bagiagia, of this group, were also examined. They are described as low, coral islands, covered by trees and grass, well suited for growing cocoanuts, and unoccupied. The southern part of the island of Nuama was afterwards visited. An examination was next made of the Trobriand group of islands, lying to the north of the D'Entrecasteaux group. The principal island is called Kiriwina. The inhabited small islands are Kuiao,

Nuata, Tuma, and Kadai, on each of which is one village. Only one language is spoken in the whole of the Kiriwina Group, and the different tribes are all one people. Having made an inspection of the group, Sir William Macgregor is very favourably impressed by the Kiriwina people and country. He estimates the population to be at least 15,000. In many ways, he states, they are a long step in advance of the natives in the neighbourhood of Collingwood Bay, on the north-east coast of the possession. They are industrious, and physically are of superior build. From a commercial point of view, Sir William is of opinion, that if some new industry could be introduced which would create something for export, there would be little doubt that Kiriwina would become an important trading centre.

Obituary.

Lord Arthur Russell.*—On the morning of the 7th July, 1880, a young Member of Parliament walked home from the House of Commons with Mr. Disraeli, who was then living at Grosvenor Gate. As they passed through Audley Square in the faint dawn, the conversation turned upon Lady William Russell. "I think," said Mr. Disraeli to his companion, "that she is the most fortunate woman in England, because she has the three nicest sons." And assuredly at that time, and for long years afterwards, most people who were in a position to express an opinion, would have said that the judgment thus announced by the leader of the party in the Commons, which was not supported by the House of Bedford, was very correct. Hastings, Arthur and Odo Russell formed a most remarkable trio. Even of the youngest, who became Lord Ampthill, and who was the only one of the three who took a very active part in public affairs, his countrymen knew but little; as, indeed, they rarely know anything of a diplomatist, unless he gets them into a war. Hastings, later the Duke of Bedford, was, partly no doubt by his own fault, one of the best misunderstood men in England, and Arthur, although known as well as any one in the most agreeable circles of London society, and with a very wide acquaintance among the best men of all lands, was hardly known at all to the general public.

The three brothers owed most of their distinguished qualities to their mother, Miss Elizabeth Rawdon, famous in youth for the beauty which Byron celebrated in 'Beppo':—

I've seen some balls and revels in my time,
And stay'd them over for some silly reason;
And then I look'd (I hope it was no crime)
To see what lady best stood out the season;
And though I've seen some thousands in their prime
Lovely and pleasing, and who still may please on,
I never saw but one (the stars withdrawn)
Whose bloom could, after dancing, dure the dawn.
The name of this Aurora I'll not mention,
Although I might, for she was nought to me
More than that patent work of God's invention,
A charming woman, whom we like to see;

* By Sir Mountstuart E. Grant Duff, *Q.C.S.I.*, President R.G.S.

But writing names would merit reprehension,
 Yet, if you like to find out this fair she,
 At the next London or Parisian ball,
 You still may mark her cheek, out-blooming all.

She was the niece of the first Marquis of Hastings, whose period of office as Governor-General was marked by so many striking events, and who heard from the lips of an Indian prince, perhaps the most remarkable compliment that ever was paid to the Great Company. "This," said the Rajah of Tehree when he offered the customary present in token of homage, "is the first Nuzzur which was ever presented by a member of my family. We refused one to Timour!"

Many who are still alive remember Lady William as a stately old lady, before the terrible accident at Rome, which made her an invalid for the rest of her life, though it was prolonged to the year 1874. Few women had read more widely or had a keener curiosity about many of the most important matters of human concern. In English politics, much as she saw of people actively engaged in them, she never managed to acclimatise herself. "My dear mother," remarked to her, on one occasion, her eldest son, "You never seem to understand that the Russells are Whigs."

After her accident she hardly ever left London, and received when there all the year round, even in September. On the evening of the 10th July, 1874, an unusually large group was gathered round her. She became suddenly faint and was wheeled out of the room. Just before reaching the door she turned to her guests and said, "Amuse yourselves as well as you can when I am gone." These were the last words which some of those present ever heard her speak, and were remembered as an appropriate farewell. Her husband, who died at Genoa in 1846, was Major-General Lord George William Russell, who distinguished himself in the Peninsular War, and was at a later period Minister, first at Lisbon, and then at Berlin. Their second son, Arthur Edward John, was born in 1824, and was brought up almost exclusively abroad. He never was at any school or university. Some people have thought that he owed to this circumstance a good deal of the reserve and diffidence which distinguished him; but I do not think that their opinion is well founded. His reserve and diffidence were a part of the man which no education would have even seriously modified. If he had gone to Eton and Oxford he would have missed a thousand advantages which he had, and gained nothing of importance which he did not gain. His first initiation into the serious business of life took place under the auspices of his uncle, the well-known Whig statesman, whom he served as Private Secretary from 1849 to 1854—a most admirable piece of training. As a preparation for the duties of an English politician he also travelled very widely, visiting the Mahomedan East, America, and most parts of Europe. I do not remember that he was ever in Russia proper; but he was present at the taking of Bomarsund during the war with the Czar Nicholas.

He entered Parliament as member for the borough of Tavistock at a bye-election in December 1857, and retained his seat until 1886, when he retired. It was painful to him, at the time, to leave political life; but, considering what has happened since, many will be inclined to say that he was only taken away from the evil to come. Throughout his whole career, and up to his latest hour, he was a strong Liberal, by which I mean that he held the opinions of his family modified by a very large infusion of the ideas which were current during his early manhood, amongst the most intelligent persons in France and Germany. No Englishman was more thoroughly in harmony with the best political thought of his time throughout Western Europe; but he had a constitutional dislike to extremes and to crotchets; to Radicalism no less than to Conservatism. His political opinions were much more

fully represented by his well thought-out and well put-together addresses to his constituents at Tavistock, than by anything he ever said in the House, where he deliberately adopted the rôle rather of a spectator than of an actor, though it would be a great mistake to suppose that he did not discharge with the most exemplary conscientiousness, all his parliamentary duties, as a member of committees, and as an adherent whose vote could always be depended upon by the Whips, whenever anything like serious business was afoot.

He made his maiden speech on March 7th, 1861, on the second night of a very interesting foreign debate begun by Mr. Hennessey, then and long afterwards far the ablest advocate of the state of things which prevailed in Italy during the years that immediately preceded 1859. Arthur Russell had just returned from Rome, where he had had the very best opportunity of hearing all that both blacks and whites had to say. Not very many members were present, but the impression which he produced upon good judges was highly favourable. His voice was excellent, and in a first speech, the House of Commons, at least in those days, expected and encouraged diffidence. It was even a "Counsel of perfection" for a thoroughly practised speaker to break down just a little, if he could manage so to do, when he first rose in Parliament; but although nothing could be more judicious than all that the new member said, and although the form of his speech was excellent, his constitutional shyness made speaking a painful effort, and he did not, I think, address the House again till the 13th March, 1863, when he was induced to do so by some remarks reflecting upon his brother Odo in a speech by Sir George Bowyer, who was then the *enfant terrible* of the Catholic party, with a curious genius for injuring his own friends by foolishly exaggerating their most unpopular opinions.

It was natural that Arthur Russell should have selected the Italian question as the subject for his maiden speech, for his interest in European politics was always keen, and he watched the resurrection of Italy with undeviating sympathy. With not less care did he follow the long and troublous evolution of the Fatherland, from the point of view of those who said, "Through freedom to unity," rather than of those who said, "Through unity to freedom." He was a devoted admirer of the late Emperor Frederick, who honoured him with his friendship, and on few hearts in this country did the blow which robbed the world of that most precious life, fall more heavily.

The crowning mercy of Königgratz won for Germany a host of English friends; but Arthur Russell felt just as kindly to her when she was extremely unpopular on this side of the North Sea. The most fervid of German patriots might well have used to him the phrase which he used to another, after his country had put her foot on the neck of her enemies, "Glad to make your acquaintance; you stood by us in very dark days."

He showed his leanings in this matter with special clearness in 1864, when nine British politicians out of ten had jumped to the conclusion that the Danes *must* be right in their interpretation of a highly complicated question of history and public law, basing their view upon two undoubted facts which, however, unfortunately, did not quite cover the whole of the ground of the Schleswig-Holstein dispute:—(1) That Denmark was a very small and extremely plucky country; (2) That the newly-married Princess of Wales was exceedingly charming. There was a moment in the Session of 1864, in which Lord Palmerston was inclined to take what might have well proved very dangerous resolves, if it had not been conveyed to him that some of his most faithful followers, of whom Arthur Russell was one, were by no means to be depended on, if anything was done which might involve this country in further complications.

Next to foreign politics, Arthur Russell cared most, I think, for questions of

religious liberty. Fully conversant with all the most important results of Biblical criticism and philosophical discussion, he saw the absolute necessity of emancipating our universities from the fetters of clerical control, which pressed so heavily on them thirty years ago, and he steadily supported the movement which, begun by Lord Monk Bretton, then Mr. Dodson, in 1863, was brought to a triumphant conclusion under the guidance of Mr., now Lord Coleridge, seven years afterwards. The disestablishment of the Irish Church also found in him a very strong partisan, but he was as a rule opposed to interference with religious institutions in England and elsewhere, merely on the ground that no wise man would call them into existence in their present shape, if the thing had now to be done for the first time. As a student he had few or no illusions, but he was a student who was intimately acquainted, not only with books, but with affairs and with men, who are much more difficult than either.

He was as far removed from being the slave of mere abstract reasoning as from being the blind adorer of mere historical right. Although the logical outcome of his thoughts upon the relations of the State to questions of the soul might have been something very different from what he saw around him, he was content that reform should come from within the Church, and by no means anxious for any violent changes coming from outside. He took, in short, very much the same view as that which commended itself to the mind of his friend Matthew Arnold.

He was also most desirous to widen and elevate, by introducing a more reasonable curriculum into the great schools of this country, the system of education under which almost all men of his generation in England had been brought up. He kept his eye on subjects of that class all through his parliamentary life, and began to do so very early. Notice of a motion for a Royal Commission upon the Public Schools was given at the beginning of the Session of 1861 by one of his parliamentary associates, and he, as well as his brother Hastings, were cognisant of all the negotiations which ended in Sir George Lewis, the then Home Secretary, agreeing to issue it. At a later period he became, and remained to his death, a member of the Senate of the London University.

I think these three, viz. foreign affairs, questions of religious liberty and education, were the departments of public affairs to which he most often recurred in private; but he cared more or less for all the more important questions which interested the political party to which he belonged. He was a typical member of the Liberal "centre," now and then leaning a little to the "left centre," and he kept up his interest in domestic, as well as in other political questions, to the very last, reading many more political speeches in the newspapers than did some of his contemporaries, who had in their time made a good many more than he. Into any details as to his political views after 1864, it would be unwise to enter here. The events of that time belong already to the calm region of history, but with 1866 and the last Premiership of Lord Russell, we should get into a Solfatara where the "ignes" are uncomfortably near. I may just mention, however, that he was what is known in the parlance of the day as a "Liberal Unionist"—that is to say, he held to the end the opinions about the relations between Ireland and the Empire which he had imbibed when Private Secretary to his uncle, and on which he, and all the party to which he belonged, had acted throughout the eight-and-twenty years during which he represented Tavistock.

In 1865 he married the eldest daughter of the Vicomte and Vicomtesse de Peyronnet. It was remarked as a curious circumstance that one of three English brothers, who occupied so distinctive a position, should have married one of three French sisters, not less noted in their own society for a certain apartness, which threw into equally strong relief the varied brilliance of their gifts.

In 1872, on the death of his cousin the eighth Duke of Bedford, his elder brother succeeded to the title, and Arthur and Odo were raised to the rank of a Duke's sons.

He was an exact, faithful, and very copious correspondent. If his letters to his brother when the latter was serving abroad at Rome and Berlin have been preserved, as I hope and think has been the case, and if his brother's to him are also safe, they will illustrate many interesting moments in the Victorian era.

For literature, properly so called, he cared less than for many other forms of intellectual activity; but he had a deep and ever present interest about the development of human thought in every direction:—

His was a restless, anxious intellect;
Eager for truth, and pining to detect;
Each ray of light that mind can cast on soul,
Chequering its course, or shining from its goal,
Each metaphysic doubt—each doctrine dim,
Plato or Pusey—had delight for him.

He joined the Royal Geographical Society in 1858, and became its Foreign Secretary in 1875; he continued to hold that office till the end, attending the meetings of the Council very regularly when in London. What his colleagues and the Society at large thought of him will be seen in another part of this month's 'Proceedings.' He was also fond of natural history, and served a good deal on the Council of the Linnean and Zoological Societies. I am under the impression that he was the first person to find in England the snake known as *Coronella Austriaca*. He was also much interested in the Anthropological Institute, and long a member of its governing body.

He inherited from his mother a love of conversation which he had throughout life abundant means of gratifying. For society, in the sense of a more or less brilliant crowd, which is that which it usually bears in great capitals, he had little taste; but there were few pleasanter houses than his own for those who cared for something a little less evanescent.

A man so essentially clubbable was naturally a lover of clubs. The Athenæum and Brooke's had few more constant frequenters, and during middle life he was a most regular habitué of the Cosmopolitan with Thackeray and Jacob Omaiium and Prince Frederick of Schleswig-Holstein, and the first Lord Houghton and Henry Phillips and Maine, and Kingslake and Venables and John Ball, and so many more who have passed away, to say nothing of not a few who remain to bewail his loss. Along with Sir John, later Lord Acton, Sir James Lacaita, and other persons, who were devoted to the custom of meeting at breakfast—far more common a generation ago than it is in these less strenuous days—he founded in 1866, the Breakfast Club, a small body which was confined to twelve, and has never, during its twenty-six years of existence had, I think, more than twenty-six members in all, counting alike the living and the dead; but which, nevertheless, was at one and the same time governing through four of its honorary, i. e. temporarily absent members, Canada, India, Madras, and Bombay.

Of another company which will make some figure in the memoirs of our times, the Metaphysical Society, he formed a part almost from first to last, and might have any evening enjoyed the pleasure or danger of sitting between Mr. Huxley and the Duke of Argyll, Cardinal Manning and Mr. James Martineau, Mr. Hutton of the 'Spectator,' and Mr. Frederic Harrison, Mr. W. R. Greg and the Bishop of Gloucester and Bristol, Mr. W. G. Ward and Mr. Mark Pattison, Mr. Walter Bagehot and Mr. Gladstone. He was for several years a member of the Dilettanti

Society, the doyen of all similar institutions, dating as it does from 1732. He became a member of "The Club" in 1875, and of Grillon's in 1883.

At various periods of his life he was nearly as familiar with society on the Continent as he was for some forty years in London. As a boy in Switzerland he had been introduced to Bonstetten who, it will be remembered, was in early life the friend of the poet Gray. As a youth in Austria he lived much with the family of Count Széchenyi, to whose vigorous initiative the whole of the Danube valley owes so much; and another of his companions, in those days, was the young Archduke Maximilian, who was destined to such romantic fortunes and to so tragic an end. In the maturity of his manhood hardly any Englishman was so well acquainted with all that deserved respect in Paris under the Second Empire. He knew intimately the learned society which gathered round M. Mohl and his clever, hospitable, eccentric wife. He was, at a later period, even more intimate with that which gathered round his mother-in-law, surpassed herself by few of that gifted circle in brightness of wit, and by none in political sagacity. He had visited Tocqueville in his Norman home, he knew Montalembert, Jules Simon, Barthélemy St. Hilaire, Rémusat, Guizot, Thiers, Renan, Lanfrey, Prévost-Paradol, and a host of others—in short, almost every one who was most worth knowing in France before 1870. In Rome the official position so long occupied by his brother Odo insured him relations of the most varied kind; and the same, but to a less extent, was the case at Berlin.

A man who possessed and assiduously used such varied opportunities of hearing all that was most interesting in contemporary politics and literature, as well as in several branches of science, might safely be inferred to have had what M. Renan has well called *la grande curiosité*. He was wedded, too, to a most excellent habit. Whenever anything really excited his interest he never let the subject go till he had informed himself thoroughly about it. I may give an instance of this which is curiously characteristic. Just at the beginning of what proved to be his last illness, a friend mentioned to him that he could find no authority for the meaning which Mr. Shorthouse, in his recent work, 'Blanche Lady Falaise,' assigns to the verb "*faïsaier*," viz. "to persist." Littré, and other books of authority, only give the meaning, to dash as a wave does against a cliff. This struck him, and he never ceased his inquiries till he was able to tell his informant that Mr. Shorthouse did not claim to have found the word anywhere used in the sense he gave to it, but that it was an invention, and (as many, including the present writer, will consider) a very happy invention of his own. Every question, philosophical, philological, geographical, botanical, or whatever it was which attracted him, was thus hunted down, with the expenditure often of much time and trouble, but greatly to the advantage of the fulness and accuracy of his information.

As is so frequently the case with those who have known "the cities and the thoughts of many men," he spent much of his later life in the country, where he had purchased a house near the village of Shere, formerly the residence of Mr. Grote, in that charming county where, as the late Lord Stanhope put it, "You meet historians and philosophers in the lanes." Here, if he did not devote himself to agriculture—"the classic diversion of a statesman's cares"—he at least devoted himself to his garden, in the laying out of which he characteristically gave much more attention to the botanical interest of his plants than to a skilful arrangement of form and colour.

Arthur Russell had not the qualities of a man destined to play a leading part on the stage of life "in the world's ample witness;" but few were better fitted to watch what passed and to exert a steady pressure in favour of all that was wise and right. Thousands of men, known in one or other department of London life, had more practical, constructive ability; very few, if any, had a surer judgment;

hundreds were more learned, few were as widely and solidly informed. Many even amongst his own acquaintance had far greater powers of expression, none had more thoroughly the secret of what is worth all the eloquence in the world, and the final outcome of the highest wisdom, the power to say "yes" and "no" in the right place. Numbers had more emotional natures, few were so gentle and unselfish. It is idle, however, to attempt to describe the man we have lost to those who did not know him. He who would do so successfully must have the palette and the brush of him who painted a character very like and very different from his—that of *Marius the Epicurean*.

Happily, a large number of people did know Arthur Russell, and if anything in this sketch has been set down by a hand too partial or too critical, will be able to correct it. If I have erred, I have at least erred in good company. A letter about his death lies before me, dated April 11th, and containing a phrase which expresses the opinion, not only of the person who penned it, an excellent judge, but of the most illustrious writer on the European continent—"C'était un des hommes les meilleurs qui aient existé."

John Murray.—By the death of Mr. John Murray, of 50, Albemarle Street, the third of that name, at the age of 84, the Society loses the last of its original Fellows, and the Council a valuable adviser.

Mr. Murray became a Fellow in 1830, and was the last Fellow of this date remaining on the list. He sat first on the Council in 1850, and in several later years. Through his position at the head of the publishing trade he was able to give his friend Sir Roderick Murchison frequent assistance in arranging for the publication of the "Transactions of the Society" at a time when this was by no means a simple matter financially. But the most valuable service he ever rendered to geography and the Society was perhaps in the recommendation of the late Mr. H. W. Bates, whose acquaintance he had made as his publisher, to the post of Assistant-Secretary. One of his last acts in business was to see and congratulate Mr. E. Whymper on the publication of his book on the *Audes*. "A very heavy book, Mr. Whymper," he said, smiling as he lifted the volume in his failing hands.

From his youth John Murray had shown the tastes both of a traveller and a scientific geographer. At Edinburgh, where he completed his education, he attended in 1826 Prof. Jamieson's lectures in natural science, saw a good deal of Mrs. Somerville and Captain Basil Hall, and met Audubon the American naturalist. A wisely indulgent father put no obstacle in the way of his natural taste for travel, and in 1829 he visited Belgium, and in the following year France and Italy. "I was," he writes, "among the first to descend the Danube from Pesth to Orsova, below Belgrade. In a timber barge I swept over the reefs and whirlpools in its bed, not yet fit for a steamer to pass." Now we find the adventurous youth on the frontier of Wallachia, now penetrating to Carinthia and the then unknown Dolomite mountains of Tyrol, ten years later exploring Central France or climbing the cliffs of Gavarrie to the *Brèche de Roland*. "I travelled," he writes, "note-book in hand, and I noted down every fact as it occurred." This simple sentence best indicates the enduring importance of these travels. They were the origin of the world-famous guide-books.

It is not generally realised, perhaps, how largely—in more than one case entirely—these were the work of young John Murray himself. So far as his contributors went, his standard was that of his correspondent, Mr. Hobhouse; they were to be "gentlemen, scholars, accomplished men in every way." They were allowed free scope, and one at least of the series, Ford's Spain, has proved a permanent contribution to literature. The handbooks were meant not for specialists or tourists, but to serve and instruct travellers of education and a general and intelligent curiosity, and this character they retain to the present day. They have had a few respectable rivals

and many unscrupulous copyists. But outside the region covered by the 'Alpine Guide' of Mr. Ball, 'Murray's Handbooks' have continuously held the first place—except, perhaps, as regards maps—in the estimation of real travellers and of inn-keepers who resent being blackmailed.

Few probably even of the late Mr. Murray's intimate friends are aware that he not only took a deep interest in science, but had written an anonymous volume dealing with the problems of physical geography. 'Scepticism in Geology,' a book of 132 pages, was published in 1877, and reached a second edition. It is a forcible and well reasoned assault on the exaggerations to which many of the opponents of the old Catastrophic Geology committed themselves in the first heat of the re-action. The author contends against those who argued that valleys and lake-basins are entirely due to water and ice erosion, that mountain chains owe their modeling almost exclusively to denudation. He puts forward the now generally accepted theory that mountain chains are the result of lateral pressure caused by shrinkage of the earth's surface, and urges forcibly that the great cracks that split transversely the axis of a granite chain cannot have been originally formed by its rivers. On some minor points (such as Ramsay's theory of lake-basins) he may seem to be flinging a theory that is already dead—dead at least outside Scotland and primers written by Scotchmen; on others opinion is still more equally divided. In a few instances he has obviously been led to go too far in depreciating the powers of water (even as now seen in action) on the earth's surface. But, as a whole, the book shows not only very wide reading, but a large amount of acute criticism and sound reasoning founded on original out-of-door observation. It may suggest a regret that Mr. Murray's business with the books of others did not leave him more time and leisure to write himself.

In conclusion, we may express the hope that the present Mr. John Murray may be as long and serviceably connected with the Royal Geographical Society as his father was, and that he may see in his lifetime an equally great advance in its fortunes.—[D. W. F.]

Lieutenant-General Edward Kaye, C.B., joined the Royal Bengal Artillery at the age of nineteen, and took part in the Afghan campaign of 1839-40. Subsequently he served in many frontier wars and in the great struggle of the Mutiny with high distinction, being frequently mentioned in despatches. He kept a detailed journal of the events of several expeditions in Afghanistan and the bordering regions and utilised the geographical information, thus practically secured, in contributions to many publications. General Kaye's most important contribution to geography was a paper on the Mountain Passes leading to the valley of the Hamian, which was read to the Royal Geographical Society in 1879, and published in the 'Proceedings.' His interest in the regions of his early expeditions never ceased. In recent years he did much by letters to the daily papers and service journals to guide public opinion on the Afghan frontier question and on the routes of strategic railways in the north-west of India. He strongly upheld the doctrine that Asia is large enough for both Russia and Britain, but he urged the importance of being prepared for hostile contingencies. Although largely controversial, the late General's writings were characteristically courteous and moderate in expression. General Kaye resided for many years at Worthing, and latterly at West Hamstead, where he died on February 21st, 1892. He was elected a Fellow of the Society in 1886.

M. J. Ogle.—Mr. M. J. Ogle, who died on April 1th, joined the Indian Survey Department about thirty years ago; and ever since, till his death, was almost entirely

* By Colonel R. G. Woodthorpe, R.E., C.B.

employed on frontier surveys, principally on the North-east Frontier and in Upper Burma. These surveys were of a peculiar nature, requiring special qualifications. Dense forests with tangled undergrowth covering hills and vales, except where portions have been cleared for cultivation, render survey work exceedingly difficult, while the hostility of the tribes often rendered it exceedingly dangerous. In conducting work of this nature, either under the orders of another or in independent charge, Mr. Ogle always showed himself very expert and full of resource. He ever displayed much tact and good temper in dealing with savage tribes, and much coolness, courage, and resolution when forced into hostilities. His name appears not only in connection with nearly all our geographical information concerning the hills bordering Assam, and a good deal of Upper Burma, but also on the North-west Frontier it is not unknown. He served in the following expeditions and campaigns:—Lushai, 1871-72; Duhla, 1874-75; Aka, 1883-84; Afghan, 1879-80; and in Upper Burma from 1886. He accompanied Mr. Ney Elias's expedition to the Salween in 1889-90. In the survey of the Naga Hills and around Manipur the survey party was frequently exposed to all the dangers and vicissitudes of a campaign, though their doings are unknown to fame.

Mr. Ogle was an ardent volunteer, and he often proved that he possessed a true soldier's instinct by his coolness under fire, his power over the men under him in moments of danger, the confidence he inspired in them, and his rapid perception of tactical points of vantage. His chief characteristic was, however, perhaps, his unswerving loyalty to his chiefs and his strong sense of duty. He never allowed personal considerations to weigh with him for one moment where his work was concerned, and he never, of his own will, lost one scrap of information, geographical or otherwise, which could possibly be obtained; and the Geol. Memorial, which the Royal Geographical Society did him the honour to award him in 1899, has not been more worthily bestowed.

He was a man of modest, retiring disposition, of great activity and endurance; a staunch and loyal comrade and a true unselfish friend, never thinking of himself, but full of thought and care for those around him. His loss is a sore one, not only to the many friends who loved and esteemed him, but also to the cause of geography and to the department he had served so long and well.

REPORT OF THE EVENING MEETINGS, SESSION 1891-92.

Eighth Meeting, 28th March, 1892.—The Right Hon. Sir M. E. GRANT] DUFF, G.C.S.I., President, in the Chair.

ELECTIONS.—Donald Andrew, Esq.; J. de la Poer Beresford, Esq.; Count Heinrich von Coudenhove; James Golding, Esq., B.A.; Robert Gray, Esq.; Reginald Sanmarz de Havilland, Esq., B.A.; Rev. J. Sewall Haworth; Lieut.-Colonel George Hutcheson, M.D.; William Inglis, Esq.; Colonel R. Parry Nisbet, C.I.E. (Bengal Staff Corps); William George Normandale, Esq., M.A.; Lieut.-General Sir Roger Palmer, Bart.; Captain J. T. Pource; James Reynish, Esq.; Robert Swan, Esq.; Frederick Taylor, Esq.; W. T. Tufton, Esq.; Robert Williams, Esq.; Arthur Wombwell, Esq.

The paper read was:—

"A recent Journey to the Head-waters of the Ucayali, Central Peru." By Alexander Ross, Esq. This paper will be published in the June number of the 'Proceedings.'

The paper was illustrated by a series of photographic slides, projected on the screen by means of the dioptric lantern. There was also an exhibition of photographs in the tea-room.

Ninth Meeting, 11th April, 1892.—The Right Hon. Sir M. E. GRANT DUFF, G.C.S.I., President, in the Chair.

PRESENTATION.—E. A. Tanqueray, Esq.

ELECTIONS.—William De Witt Alexander, Esq.; Arthur Clive Bell, Esq.; Captain W. E. Bentley; Walter Dabney Heinemann, Esq.; George Thomas Helsdon, Esq.; Henry James, Esq.; James Francis Kendal, Esq.; Captain R. S. MacLagan, R.E.; Arthur Easton Thomas, Esq.

The paper read was:—

"A Recent Expedition under Captain F. G. Dundas, R.N., up the River Tana to Mount Kenia." By Ernest Gedge, Esq. With a Brief Sketch of the Geography around Mount Kenia, in the light of recent explorations. By E. G. Ravenstein, Esq.

The paper was illustrated by means of the dioptric lantern. There was also an exhibition of photographs and curios in the tea-room.

Before the reading of the paper the President made the following remarks:—Before we proceed to the regular business of the evening, it is my very sad duty to announce that two most distinguished members of our body, Mr. John Murray and Lord Arthur Russell, have passed from amongst us; the first in ripe and honoured old age, the second at a period of life when this Society might reasonably have hoped to avail itself of his aid and advice for many years to come. Your Council has passed the following resolutions, with which I think all members present will wish to associate themselves:—

"The Council requests the President to convey to Lady Arthur Russell and to the children of its late Foreign Secretary its sincere sympathy in the heavy affliction which has fallen on them and on the Society. For seventeen years Lord Arthur Russell gave to his colleagues the assistance of his great knowledge, his far-reaching connections in the chief centres of intelligence, his admirable temper, and his intuitive sureness of judgment—a sureness of judgment which long experience of men and of affairs had ripened into wisdom. The Council knows well that no expression of its sorrow and respect can soothe the grief of those whom it desires the President to address; but it feels that it would be wanting in its duty alike to itself and to those whom it represents if it were not to show, in the only way it can, how deeply it feels its irreparable loss."

"The Council has heard with sincere regret of the death of Mr. John Murray, who had been a Member of the Society since its foundation in 1830. In conjunction with Sir Roderick Murchison Mr. Murray did much, both as a Member of Council and as the publisher of the Society's Transactions, to establish its position and promote its usefulness, and he showed at all times a lively interest in its prosperity."

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—March 4th, 1892: M. CHEYSSON in the Chair.—M. Marcel Dubois presented the two first numbers of a new review, entitled '*Annales de Géographie*,' which, he said, had for its object the development in France of the taste for scientific geography.—He also referred to the geographical section, which the Minister of Public Instruction recently inaugurated at the Sorbonne.

M. FABERT ON THE COUNTRY OF THE TRARZAS AND SOUTH-WEST SAHARA.

M. Léon Fabert gave a geographical and ethnographical description of the countries recently traversed by him. His two principal companions were M. Georges Descemet, a young and courageous creole of St. Louis, and M. Ben-El-Moghad, interpreter to the Colonial Government. The country was in a state of war at the time the traveller passed through, and he was present at the battle of Schutelma, which was fought on the 9th September at the northern point of Lake Cayor, between Ahmet Salum, now King of the Trarzas, and his uncle Amar, supported by the two great warlike tribes of the Ulad Daman and the Ulad Aid. The victor, Ahmet Salum, furnished the traveller with camels and an escort of forty *Arrufats* in order to reach the north of the country. The party marched first to the north-west and arrived at the camps of the *Arrufat* at Argub and Abuizir. The region was in a dangerous state to cross, as the robber tribes of the Aleb and Ued Delim, excited by recent military events, were scouring the country. After several days' march to the north-east, the traveller arrived at Tenyera, the camp of the sheikh Sadi Bu, with whom he ascended to the country of Harish, on the border of the plain of the Inehiri. This chief seemed favourably disposed towards the French. After spending a fortnight in his camp, M. Fabert proceeded south-west towards the Atlantic littoral, visiting the former site of Portendick, and marching for several days along the hills which line the *Aftuth*. Altogether his journey covered about 750 miles, and some of the country had been only partly explored. The general characteristics of the region are undulating hills, with clumps of grasses and alfa, few trees. Between Harish and Amukraz the country is very hilly, and the traveller discovered there a deep valley, the great Terg (*Targa Kebira*), covered with fruit trees, which constitutes a main route between the *Aftuth* and the Adrar, as well as the Tagant.

— March 18th, 1892: General DERRÉCAGAX in the Chair.—M. G. Roland, mining engineer, addressed a copy of his communication to the Academy of Sciences on the régime of subterranean waters in the Upper Sahara, between Laghuat and El Golea.*—M. J. Chiron replied to some observations made by M. A. de Lapparent on his communication as to the geography of the Vosges†—M. Daniel Bellet made a communication upon the railways of Russia, in the course of which he commented upon the comparative lack of connection in the railways and also the number of passengers, which is much less per mile than in other countries.—M. Venukoff presented a Russian map, not yet published, of Khorassan, Southern Turkmania, and Herat. This map, on the scale of 1:1,680,000, is stated to represent the countries just named much more in detail than the great English map of St. John, and with even more exactitude than the recently published map of Mr. Curzon. It contains particularly the results of the researches of M. Strelbitzky (son of General Strelbitzky) in Eastern Khorassan, where that traveller has dis-

* See *Geographical Notes*, p. 324.† *Ibid.*, p. 318.

covered several mountains, lakes, rivers, &c., before unknown. M. Venukoff further called attention to the second volume of the 'Description de la Mongolie,' by Colonel Batoraky, and to an important work, not yet published, on the application of the reversible pendulum to investigations on the weight and form of the earth. The author, M. Sokoloff, has embodied in it the results of the observations recently made in Russia at forty-three different stations from Novaya Zemlya to Ararat and the North Cape to the mouth of the Danube.—A letter was read from M. Foureau to the Governor-General of Algeria, dated 20th February, from Tabankort, on the route from In-Salah to Ghadames, in which he stated that he was busy establishing posts in order to give security to the Sahara. The whole of the Central Sahara is at present unsafe for travellers.—A letter from M. Foa, who is travelling in Central Africa, was also read. He wrote on 1st November from near Undi (15° 20' S. lat. and 33° 35' E. long.) to the effect that he had accomplished an interesting journey to the north of the Zambezi through the little-known region lying between 31° and 33° of longitude. He had spent two months and a half among the Atchecundas and the Azimbas, and had just arrived among the Agoas. He states that no European, save an Englishman who visited the Atchecundas about two years ago, has ever penetrated into these territories. The natives are of a low type and absolutely destitute of any civilization. The country is mountainous and abounds in deep ravines; there are immense forest glades where the elephant passes unperceived. The region is healthy. M. Foa has an escort of 140 men, and he has surveyed some 800 square miles of the country inhabited by the Atchecundas and Azimbas.—News of M. L. Dècle's travels on the Upper Zambezi was communicated in a letter to the President.*—From some notes forwarded by Count Meyners d'Estrey it appears that Commandant C. von François has undertaken an expedition to the river Okavango, in order to explore the north-eastern part of the country of Damara-Ovambo, known to us only from the accounts of Boer emigrants, and as regards the southern part from the narratives of Schinz. The territory explored comprises the north-western part of the great marshes of the basin of the Ngami. The soil being like that of the Kalahari desert, this region may be considered as forming a transition to the tropical countries of Central Africa. The mountainous country which terminates near Groot Fontein, is followed to the north and east by a slightly undulating plateau, which slopes gently down towards the Okavango and Lake Ngami. The soil, at the surface, is formed of a white and red sand which appears to extend by Debra in a N.N.E. direction. In the deep beds clay is found, and between Debra and Groot Fontein limestone rocks. In the valley of the Okavango and Omuramba there is a quantity of reddish quartz, gneiss, and granite. The streams which traverse the plateau and empty themselves into the Okavango are the Omuramba the Kaudum, and the Zailom, which have several affluents and are not deep. They are quite dry during a great portion of the year, and then it is impossible to travel in the country.—In conclusion, M. D. Bellet made some observations upon the population of England in the nineteenth century, and M. E. Levasscur, of the Institute, also spoke on the same subject.†

* See Geographical Notes, p. 325.

† Ibid., p. 317.

NEW GEOGRAPHICAL PUBLICATIONS.

EUROPE.

Baedeker, K.—Italy. Handbook for Travellers. First part. Northern Italy, including Leghorn, Florence, Ravenna, and Routes through Switzerland and Austria. With 16 maps and 28 plans. 9th edition. Leipzig, Karl Baedeker; London, Dulau & Co., 1892: 12mo, pp. lxii. and 464. Price 8 marks. [Presented by Messrs. Dulau & Co.]

[**Bosnia and Herzegovina.**]—Von der Adria bis Sarajevo. Herausgegeben von der Landesregierung für Bosnien und die Herzegowina. 12mo, pp. 60, illustrations.

Brückner, [Prof. Dr.] E.—Eiszeit-Studien in den südöstlichen Alpen. Bern, 1891: 8vo, pp. 9. [Presented by the Author.]

Déchy, Maurice de.—Recherches sur l'orographie et la glaciologie du Caucase Central. (Extrait abrégé d'une lecture donnée à la séance générale du 9 août au Congrès de Paris.) 8vo, pp. 4.

— Neuere Forschungen und Bergreisen im Kaukasischen Hochgebirge. I. (Separatdruck) aus den "Mittheilungen des D. u. Oe. A.-V.," Jahrgang 1889, Nr. 4, 12mo, pp. 12.

— ditto, II. Wien, 1891: 12mo, pp. 15.

— The Ascent of Maglich. Reprinted from 'The Alpine Journal,' November 1889. London, 1889: 8vo, pp. 15, map and illustrations. [The above four pamphlets were presented by the Author.]

ASIA.

Cumming, C. F. Gordon.—Two Happy Years in Ceylon. 2 vols. Edinburgh and London, W. Blackwood & Sons, 1892: 8vo, pp. (vol. i.) vi. and 138, (vol. ii.) 442. Price 30s. [Presented by the Publishers.]

Miss Gordon Cumming has evidently seen a great deal of Ceylon, the present volumes containing one of the best general descriptions of the island that has appeared of late years. The authoress gives no dates, though her visits appear to have been made some years ago. She seems to have visited all the principal places of interest, including many of the old forts, tombs, and temples. Her volumes contain, among other things, many interesting notes on the natural history of the island, its productions, &c. Soon after her arrival Miss Gordon Cumming accompanied the Bishop of Colombo on a visitation along the west coast to the north of Colombo. On this trip, which took her among the lagoons and sandbanks which fringe this part of the coast, she had exceptional opportunities afforded her of studying the natural history of the region and of gaining an insight into the habits of the people. The value of the work is greatly increased by the number of excellent illustrations; a map is also given.

Hooker, [Sir] Joseph Dalton.—Himalayan Journals, or, Notes of a Naturalist in Bengal, the Sikkim and Nepal Himalayas, the Khasia Mountains, &c. (The Minerva Library of Famous Books.) London, &c. Ward, Lock, & Co., 1891: 12mo, pp. xxxi. and 574, maps and illustrations. Price 2s. [Presented by the Publishers.]

The present cheap and handy edition of Sir Joseph Hooker's standard work will, no doubt, be welcome to many readers. It is reprinted from the first (unabridged) edition (published in 1854), with the omission of some of the appendices which were only of limited general interest; and is illustrated with copies of the original woodcuts, many of them from original drawings by Sir Joseph. A slight sketch of the career of the author is given in the Introduction.

India.—Archæological Survey of, South-Indian Inscriptions, Tamil Inscriptions of Rajaraja, Rajendra-Chola, and others in the Rajarajesvara Temple at Tanjavur. Edited and translated by E. Hultzsch, PH.D. Volume II.—Part I. Inscriptions on the Walls of the Central Shrine. With four plates. Madras, 1891: 4to, pp. 119. [Presented by the India Office.]

[**Madras Presidency.**]—Report on the Administration of the Madras Presidency during the year 1890-91. Part I.—Summary of the Administration. Part II.—Departmental Chapters. Part III.—Appendix, Statistical Returns. Part IV.—Special Appendix. Madras, 1891: folio, pp. xvi., (41), 224, and cxxxv.

Chapter I. of the Appendix deals with the Physical and Political Geography of the country. The Report contains two maps. 1. Map showing Irrigation Works and Navigable Canals in the Madras Presidency. 2. Sketch-map showing Lines of Railway, existing and proposed, in the Madras Presidency.

Randall, [Capt.] F. M.—Manual of the Siyin Dialect spoken in the Northern Chin Hills. Rangoon, 1891: 8vo, pp. 47. [Presented by the Author.]

AFRICA.

Antananarivo Annual and Madagascar Magazine, The, Edited by the Rev. J. Sibree, F.R.G.S., and Rev. R. Baron, F.R.S., F.G.S. No. XV.—Christmas, 1891. (Part II. of vol. iv.) Antananarivo, 1891, 8vo. [Presented by the Rev. J. Sibree.]

Among the more important papers, &c., in this No. are the following:—Has there been a Race of Pygmies in Madagascar, by Capt. S. P. Oliver; this question Captain Oliver answers in the negative. First visit of a European to the Betsimisaraka Tribe, by Rev. E. O. MacMahon; Madagascar Ornithology, Malagasy Birds arranged according to the Natural Orders, with Notes on their Habits and Habitats, and their connection with native Folk-Lore and Superstitions, Part III., by Rev. J. Sibree; Funeral Ceremonies among the Malagasy, translated from the French of M. Alfred Grandidier, by Rev. J. Sibree; Sir Robert Townsend Farquhar and the Malagasy Slave Trade, by Captain S. P. Oliver; the Flora of Madagascar, by Rev. R. Baron; the Oratory, Songs, Legends, and Folk-Tales of the Malagasy, Part III., by Rev. J. Sibree; The Great Hova City, by Rev. W. E. Cousins; Daily Tables of the Temperature and Rainfall for 1891, by Rev. J. Richardson.

Chaudoin, E.—Trois Mois de Captivité au Dahomey. Paris, Hachette & Co., 1891: 12mo, pp. xi. and 409, illustrations. Price 4s.

Contains a general account of Dahomey and its people, with their manners and customs, politics, religion, music, literature, and warfare. There is also a chapter on the geography of the country. The first part of the volume mainly deals with the town of Whydah.

Gessi, Romolo (Pasha).—Seven Years in the Soudan. Collected and edited by his son Felix Gessi. Illustrated. London, Sampson, Low, Marston, & Co., Ltd., 1892: 8vo, pp. xxiv. and 467. Price 18s.

We are already well acquainted with the adventures and explorations of Gessi, and if this volume cannot give much new geographical information, it is nevertheless of importance for all those who take an interest in the Upper Nile countries. The campaign against the slave hunters which Gessi so successfully effected, will have to be repeated some day, if these rich territories are ever to be recovered from their present state of misery and barbarism; and the modest reports which the volume gives of Gessi Pasha's exploits and almost unheard of privations, will always be valued as coming from a man of rare energy and courage who sacrificed his life for the opening up and the civilisation of the Egyptian Sudan.—[H. S.]

Goldmann, C. S.—The Financial, Statistical, and General History of the Gold and other Companies of Witwatersrand, South Africa. London, Edinbrough Wilson & Co., 1892: large 8vo, pp. xxv. and 271, plan. [Presented by the Author.]

Poiré, Eugène.—*La Tunisie Française.* Paris, E. Plon, Nourrit & Co., 1892: 12mo, pp. 302. Price 2s. 8d.

An account of excursions to various places in the French protectorate. There are chapters descriptive of the town and port of Tunis, Carthage, Bizerta, Kairwan, and Susa; besides others dealing with the inhabitants, &c. The last two chapters treat of the east coast, with notices of such places as the Kerkenah Islands, Sfax, the Oasis of Gabes, the Jerid Oasis, and the Island of Jerba, &c.

AMERICA.

[Costa Rica.]—*Viaje de Exploracion al valle del Rio Grande de Terraba,* por H. Pittier, Director del Instituto fisico-geografico de Costa Rica. San José de Costa Rica, 1891.

The basin of the Rio Grande de Terraba occupies the south-western part of the Republic of Costa Rica, bordering on the Pacific, with mountains rising to a height of 8000 to 9000 feet, forming the water-parting between the two oceans. It is irrigated by numerous streams, and the greater part is still covered with forest. Señor Pittier, after exploring this river basin, strongly represented its capacity for the cultivation of cereals, while the slopes of the mountains are adapted for rearing flocks and herds. Yet the region is still scarcely known, and the necessities of life are imported into Costa Rica from Nicaragua and Chiriqui. The reason of this isolation of the rich Terraba region is the difficulty of transit presented by the rugged mountains which almost encircle it. In proposing the construction of roads, and the colonisation of the Terraba valley, Señor Pittier very properly insists upon justice for the aboriginal inhabitants, and that no settlers should be allowed to establish themselves on the lands of the Indian villages of Terraba, Boruca, Ujaras, or Cabagra. The perusal of his interesting report, which is accompanied by a good map, reminds us that there are still many unexplored regions in the New World which deserve the attention of geographers.—[C. E. M.]

Dawson, G. M.—On the Glaciation of the Northern Part of the Cordillera, with an attempt to correlate the events of the Glacial Period in the Cordillera and Great Plains. [From the 'American Geologist' for Sept. 1890.] 8vo.

Howell, E. J.—*Mexico: its Progress and Commercial Possibilities.* London, W. B. Whittingham & Co., 1892: 8vo, pp. x. and 203. Price 5s. [Presented by the Author.]

This volume, mainly of commercial interest, consists of a collection of facts and figures bearing on the present state and position of Mexico as a field for British enterprise. There are chapters dealing with Old Mexico and the Mexico of to-day; climate and altitude; the government; population; language and education; agricultural products; the public land system and laws; industries and manufactures; mines and mining; railways; the Atlantic and Pacific ports; shipping; Mexican trade; financial position of the country; coinage and banking, &c. A map of Mexico, showing railways opened and those in course of construction, illustrates the volume.

Powell, J. W.—Tenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1888-89. Part I. Geology; Part II. Irrigation. Washington, Government Printing Office, 1890: 4to, pp. (Part I.) xv. and 774; (Part II.) viii. and 123. [Presented by the Director of the Survey.]

Part I. of this work contains the usual Report of the Director, and Administrative Reports. The most important of the accompanying papers, from a geographical point of view, is the "General Account of the Freshwater Morasses of the United States, with a Description of the Dismal Swamp District of Virginia and North Carolina," by Nathaniel Southgate Shaler. The author divides his subject into two parts. In Part I. he treats of Inundated Lands under such headings as the Classification of Swamps, under the sub-headings of Classification of inundated lands based on physical characters, Delta swamps, and Classification of inundated lands based on character of the vegetation; Effect of

certain plants on the formation of morasses; Mangrove swamps; The effect of glacial action in perturbing drainage; Economic uses of morasses; and Area of inundated lands in the United States which are available to agricultural uses. Each of these subjects is treated of in a masterly manner. As to the formation of swamps, Prof. Shaler states:—"The formation of swamps in any district depends upon conditions which retain upon the surface a sufficient quantity of water to prevent the complete decay of the vegetable matter which may be accumulated upon it. The most important conditions which determine the development of swamps arise from the relation between the rainfall of a district, the gradients by which that rainfall descends to the sea, and the temperature of the given district. Thus in an arid region very gentle gradients will fail to develop swamps, while in a moderately humid district such areas are almost always converted into marshes. Where the rainfall of the country, though considerable, is irregularly distributed through the year, the period of dryness may permit the desiccation of nascent swamps and consequent oxidation of their carbonaceous material, and thus prevent the development of marshes which otherwise would occupy the area. The further south the given region may be, the more likely is the heat and dryness of the arid time of the year to desiccate the surface. Consequently, in southern regions a smaller declivity of surface will insure the absence of swamps than is necessary in northern countries, where both regions have the same annual amount of rainfall."

The Dismal Swamp, the subject treated of in Part II. of this report, is the northernmost part of the characteristic swamp country which borders the southern Atlantic coast. It belongs altogether to that group of inundated lands where the lack of drainage is due to an original deficiency of slope, combined with the flow-retarding influence of vegetation on the movement of water from the land. An interesting feature in the topography of the Dismal Swamp is the presence of a considerable lake occupying a tolerably central position in the part of the morass which lies to the west of the main canal. The basin it occupies is everywhere shallow; probably in its natural state the maximum depth was not over six feet. Prof. Shaler's conclusions as to the way in which this central lake of the Dismal Swamp was formed are as follows:—"The gently sloping platform on which the Dismal Swamp rests evidently emerged from the sea in a somewhat rapid manner; the absence of any marine bench on its surface appears to be conclusive evidence of this. At first we may assume that the sterile character of the soil would have prevented the simultaneous growth of forest-trees and other plants of a higher order over the greater part of the plain. The growth of such plants would naturally have begun on the periphery of the district, either on the western border where the soil had already been formed, or next the sea, where the humidity would favour the growth of plants, even on barren sands. I conceive that, beginning on the margin, the forest would advance towards the centre of the field, and the fallen trees and other entanglements would serve to form an obstruction to the outflow of the water, and thus to retain the central part of the area in the condition of a shallow lake. The area of this basin would be gradually narrowed by the growth of the cypresses, black gums, and other trees which can maintain their roots beneath the level of permanent water. Notwithstanding the fact that the level of the water in Lake Drummond has been raised since the construction of the Dismal Swamp Canal, the forest is still slowly gaining upon the area of the lake at several points. Leaves and drifted wood accumulate next the shore and shallow the basin, so that, gradually, trees can find a foothold in what was recently open water." From this it would seem that Lake Drummond belongs to the type of peat-enclosed lakes which are so common in the small morasses of the glaciated area.

Other papers appearing in Part I. are:—The Penokee Iron-bearing Series of Michigan and Wisconsin, by Roland Duer Irving and Charles Richard Van Hise; and the Fauna of the Lower Cambrian or Olenellus Zone, by Charles D. Walcott. There are an abundance of illustrations, besides some carefully worked-out maps.

Part II. of the present Report consists of the First Annual Report of the United States Irrigation Survey. This Survey has for its object the reclamation,

by means of irrigation, of as much as possible of the arid region of the United States. The area of the arid region is about 1,300,000 square miles—one-third of the entire country. The Director of the Survey, Mr. J. W. Powell, is of opinion that of this area there can be economically reclaimed, by irrigation, within the present generation, at least 150,000 square miles—an empire one-half as large as the entire area now cultivated in the United States. The present Part contains, among other things, a collection of official letters referring to the origin of the irrigation survey; preliminary report on the organisation and prosecution of the survey of the arid lands for purposes of irrigation; purpose, and plan of the survey, and the Reports of Prof. A. H. Thompson on the topographic work, and of Capt. C. E. Dutton on the engineering and hydraulic work. Work was begun in October 1888 and carried on during 1888 and 1889 in Montana, Idaho, Nevada, California, Utah, New Mexico, and Colorado.

Turner, Thomas A.—*Argentina and the Argentines: Notes and Impressions of a Five Years' Sojourn in the Argentine Republic, 1885-90.* London, Sonnenschein & Co., 1892: 8vo, pp. xvi. and 370, illustrations. Price 15s. [Presented by the Publishers.]

These "Notes" on the whole give a good idea of the present condition of things in the Argentine Republic. During his five years' sojourn at Buenos Ayres, the author, apparently, had many opportunities afforded him of seeing a great deal of the Argentine people of all classes, as he states, from journalists to generals, but more particularly Government officials in the federal and provincial capitals; having mingled with them in work and play, and lived with them as one of themselves, his observations on their general character should be of some importance. The volume contains descriptions of the city of Buenos Ayres, as it is at the present day, and of La Plata; it also contains notes on the physical features of Argentina, and on the Province of Buenos Ayres, its climate, &c., but apart from this there is little of geographical interest in the work.

OCEANIA.

Young, Robert.—*The Martyr Islands of the New Hebrides and adjacent Groups.* Edinburgh, Macniven & Wallace; London, S. W. Partridge & Co., 1889: 12mo, pp. 47, map.

GENERAL.

Britannic Confederation.—Edited, with an Introduction, by Arthur Silva White. London, G. Philip & Son, 1892: cr. 8vo, pp. xv. and 180, map and diagrams. Price 3s. 6d. [Presented by the Publishers.]

Consists of a collection of essays, originally published in the 'Scottish Geographical Magazine,' dealing with the question of Imperial Confederation. After the Editor's Introduction, Sir John Colomb leads with a Survey of Existing Conditions, followed by an able paper by Prof. E. A. Freeman, on the Physical and Political Bases of National Unity. Mr. G. G. Chisholm next contributes a paper on the Commerce of the British Empire, followed by Tariffs and International Commerce, by Prof. J. Shield Nicholson; Alternative Measures, by Maurice H. Hervey; the Consolidation of the British Empire, by the Right Hon. Lord Thring. The map, illustrating this series of papers, represents the British Empire, indicating its official and commercial relations; the diagrams illustrate Mr. Chisholm's paper.

Faure, C.—*Congrès International des Sciences Géographiques tenu à Paris en 1889. Exposé sommaire des Voyages et Travaux Géographiques des Sciences dans le cours du XIX^e siècle.* Paris, 1891: 8vo, pp. 47. [Presented by the Author.]

Geographisches Jahrbuch. Bände XIV. und XV. 1890-1892. Herausgegeben von Prof. Dr. Hermann Wagner.

The 14th and 15th volumes of this valuable publication, edited by Professor Wagner, of Göttingen, and published by Perthes at Gotha, contain much

valuable information regarding the progress of geographical science during the last four or five years.

The advance of exploration which is dealt with by Professor Hahn and Dr. Luliez (both of Königsberg), Dr. Baas, of Worcester, Mass., Professor Sievers, of Gießen, and H. Wichmann, of Gotha, occupies 240 of nearly 500 pages in volume xiv. Professor Wagner himself reports on geographical education in the same volume, which also contains an obituary for 1888-1890, and a report on geographical societies and congresses. Volume xv. deals with the progress of sciences related to geography, as geology, meteorology, ethnology, oceanography, and the study of terrestrial magnetism.

Pector, Désiré.—*Aperçu des principales communications relatives à la Linguistique faites au Congrès International des Américanistes (Huitième Session, Paris, 1890).* Paris, J. Maisonneuve, 1891: 8vo, pp. 16. [Presented by the Author.]

Tyndall, John (F.R.S.)—*New Fragments.* London, Longmans & Co., 1892: cr. 8vo, pp. 500. Price 10s. 6d. [Presented by the Publishers.]

The interest of this volume, the third of Dr. Tyndall's collected "Fragments," is, in the first place, autobiographical and biographical. It contains an account of the author's own early career, his memories of Carlyle, and his vivid sketches of the life and work of his predecessors at the Royal Institution, Count Rumford and Thomas Young. Next, it is scientific, in the chapters on Pasteur's and Koch's discoveries, and others. Three papers on the Alps fall within the province of geography. In these Dr. Tyndall analyses and explains Alpine phenomena, and describes Alpine life and adventure with his characteristic clearness and imaginative force, illustrating his descriptions, after his wont, with personal details and anecdotes, which make the reader feel as if he were the friend and companion of his author. He dwells on a point sometimes neglected, the wreck of rocks on mountain tops, owing to the expansion of water in solidifying, one of the main causes of mountain decay. He goes back once more to his old adventures on the Matterhorn. He does not act on the instructions of a recent primer that the man of science must give a mountain's inches and leave out its picturesque effect. He describes nature's colours as well as analyses them.

But why does Dr. Tyndall reprint a passage (p. 453) in which he urged that the slow motion of the end of the Morteratsch Glacier "meets point-blank an objection raised by that very distinguished man, Professor Studer, of Bern, to the notion that a glacier exercises an erosive action on its own bed?" Studer's objection to the exaggeration of glacial erosion was based on the fact that the glaciers of Chamonix and others do not bury their snouts in the soil. Dr. Tyndall's reply is, that it is only fast glaciers that erode, that the snout of the Morteratsch Glacier moves slowly, and therefore does not act as a gouge. But other Alpine glaciers, e.g. the Bossons, move comparatively fast at their lower extremities, and none of these delve any more than does the Morteratsch. When Dr. Tyndall can find the snout of any glacier, fast or slow, delving he will meet the late Professor Studer; this discharge seems mere blank cartridge.

Uzielli, G.—*Leonardo da Vinci e le Alpi con sette Carte antiche in Fac-simile.* Boll. del Club Alp. Italiano, vol. xxiii. No. 56.

Some years ago I called attention* to the Alpine notes of Leonardo da Vinci, as set out by Dr. Richter. Since that time M. Ravaisson Moillon has been carrying out the issue in facsimile of Leonardo's sketches and notes in the Louvre, a great work still incomplete, before the completion of which it would hardly be judicious to attempt any final note on the subject.†

Meantime, however, we may notice the learned paper contributed by Signor Uzielli to the Bollettino of the Italian Alpine Club, which has solved one of the chief problems with regard to Leonardo's travels in a sense different to that I had indicated in 1885 as probable. Leonardo, it may be remembered, went

* 'Proc. R.G.S.,' New Series, vol. vi. p. 33; 'Alpine Journal,' vol. viii. p. 20.

up to a high mountain called "Monboso," where he saw and described many strange things. Overlooking a paper published by Signor Farinetti in 1867 in No. 9 of the *Bollettino*, which seems also to have escaped Signor Uzielli's notice, I guessed that this might be a copyist's error for Monveso, the local form of Monte Viso.

Signor Uzielli now reminds us of what Signor Farinetti had already pointed out, that in Val Sesia Mons Bosus or Monboso was among the names used from the middle of the fifteenth to the middle of the eighteenth century for the group of Monte Rosa. Flavio Biondo, in his *'Italia Illustrata,'* which he completed in 1451, was the first to speak of "Mons Bosus nomine Coctiarum Alpium promontorium (the divisions of the Alps at this date were often confused), ceteros superans Italia montes, ad ipsum verticem, quem semper continuitatis etestate nivibus tectum habet, omnino inaccessibilis est; cui haeret contiguus, paulo celsitudine demissior, mons, nunc Gazaronum appellatus." The "Mons Gazaronum" is easily identified, it lies between Biella and Varallo, among the lower spurs of Monte Rosa. L. Aiberti, another geographer, writing in 1588, mentions Monboso with the difference that he says that *beyond it* is a range (giogo), the highest in Italy. Finally a Bishop of Novara (Bascapa), writing an account of his diocese circa 1600, gives an account of the great snow mountain between Alagna and the Valais, in similar terms but without assigning to it any name.

The name is found in various quarters down to the maps of Van der Aa circa 1700, "M. Boso Rosa," and Delisle, 1740, "Mon Boso dit Rosa." The form "Mons Sylvius," possibly a latinisation of Monte Boso or Bosco, is found at the same epoch in several writers. At the present day, the name Monte Bo is given to the last high spur of Monte Rosa south of Gressoney, 8386 feet.

Magini, in 1620, gives the name Monte della Roiza, the key to Simler's (A.D. 1574) Mons Rosae.

The different names seem to explain themselves simply enough. The Valaisans called the pass they used (the St. Theodul)—it was passes, not summits, that first got names—Der Glotcher; the Val d'Aostans, la rossa or ruiza, which was the equivalent in their patois. The Val Sesians called their mountains Monte Boso—whence perhaps Sylvius. Leonardo, coming from Milan, used the Val Sesian name.

There is one difficulty to be got over. Leonardo describes Mons Bosus as between France and Italy. Monte Rosa does not strike one at first sight as fulfilling this condition. But attention has been most opportunely called to a series of maps painted in 1570 on the walls of a room in the Palazzo della Signoria at Florence, in which all the country between the Alps and the Rhine is treated as appartenant to France.*

Signor Uzielli further corrects me rightly, I think, by pointing out that Bellinzona is probably a true reading, and that the "San Gervagio" mentioned by Leonardo can hardly be the faubourg of Geneva north of the Rhone—though that certainly never was, as he supposes, in Piedmont. But on other points I must maintain my previous statements. It is preposterous to cite as a proof of Leonardo's physical knowledge his statement that the mountain "rises above almost all clouds, and snow falls there rarely, but only hail in summer, when the clouds rise highest." No man who had ever been in a snowstorm on the High Alps would so commit himself. What is curious is, that Leonardo, who may have got as far as the rocks above the Col d'Ollen (where, at a height of 10,000 feet, the inscription "A. T. M. 1615" has been found cut in the crags), seems to have noticed the granular structure of glacier ice, and to account for it invented the hypothesis that it hailed in place of snowing on the highest peaks. Signor Uzielli has further represented me as writing the exact contrary to what I have written as to the derivation of Rosa, the connection of which with the patois word *Ressa* I was among the first to point out.† He makes the cliff in 'King Lear,' called "ten masts high" by Shakespeare, an "altissimo monte"; he disregards

* 'Jahrbuch des Schweizer Alpenklub, 1891.

† Murray's 'Handbook to Switzerland,' 1895.

the proof furnished by myself and amplified by Signor Brentari,* that Danto was a keen lover of mountain scenery and exercise. He identifies "Brusson" with Brieg in place of Brusson in Val d'Ayas; he does not recognise the Albula Pass in the M. dell'Alba or the Col de la Galise in Mons Gales. A writer who, finding in Ortelius, A.D. 1570, the names M. Rosio, M. Macugnago, and M. Sempino, suggests that they may be identified not with the St. Theodul, Moro, and Simplon Passes, but with the Matterhorn, Monte Rosa, and Monte Leone, gives the measure of his critical discrimination. We will only add that he has gone very far wrong in his references to Mont Blanc; asserting that the name was popularised by Windham and Pococke, who do not once mention it; that Bourrit in 1737 was the first to print it, whereas Pierre Martel, De Saussure, Bordier, Deluc, Bourrit, and Coxe had preceded him in doing so.

In short, Signor Uzielli is an industrious student, but an uncertain guide, wanting both in general literary and out-of-door knowledge of the Alps.

He has left to a successor to unravel finally Leonardo's travels. For this purpose the beautiful Alpine sketches at Windsor should be photographed and the writing on them deciphered, and the sketches (if any) attached to the sheet bearing the words "Geneva," "San Gervasio," in the Codex Atlanticus at Milan carefully studied.—[D. W. F.]

Wallace, A. R.—*Island Life, or the Phenomena and Causes of Insular Faunas and Flora*, including a revision and attempted solution of the problem of geological climates. 2nd and revised edition. London, Macmillan & Co., 1892: small 8vo, pp. xx. and 563, maps and diagrams. Price 6s. [Presented by the Publishers.]

During the twelve years that have elapsed since the first edition of the present work was issued, considerable additions have been made to our knowledge of the natural history of some of the islands, rendering necessary a thorough revision of the whole work. Upon this task Mr. Wallace has apparently bestowed great care. The first edition was noticed in the 'Proceedings' for 1880, at p. 713; it will therefore be sufficient, in the present instance, to note the more important changes that have been made. These are as follows:—Chapter vii. The account of the migrations of animals and plants during and since the Glacial Epoch has been modified to accord with newer information; Chapters viii. and ix. The discussion of the causes of Glacial Epochs and mild Arctic climates has been somewhat modified in view of the late Dr. Croll's remarks, and the argument rendered clearer; chapter xiii. Several additions to the fauna of the Galapagos have been noted; chapter xv. Considerable additions have been made to this chapter, embodying the recent discoveries of birds and insects new to the Sandwich Islands, while a much fuller account has been given of its flora; chapter xvi. Important additions and corrections have been made in the lists of peculiar British animals and plants, embodying the most recent information; chapter xvii. Very large additions have been made to the mammals and birds of Borneo, and full lists of the peculiar species are given; chapter xviii. A more accurate account is given of the birds of Japan; chapter xix. The recent additions to the mammals and birds of Madagascar are embodied in this chapter, and a fuller sketch is given of the flora of the island; chapter xxi. and xxii. Some important additions have been made to these chapters, owing to more accurate information as to the depth of the sea around New Zealand, and to the discovery of abundant remains of fossil plants of the tertiary and cretaceous periods, both in New Zealand and Australia.

Wilkinson, J. J. G.—*The African and the true Christian Religion his Magna Charta. A Study in the Writings of Emanuel Swedenborg*. London, James Speirs, 1892: 8vo, pp. x. and 245. Price 6s. [Presented by the Author.]

* 'Alpine Journal,' vol. x. p. 409; Bollettino del C. A. I., 1887, pp. 12-61.

NEW MAPS.

(By J. COLKS, Map Curator R.O.S.)

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This map is one of a series of Reduced Ordnance Survey Maps published by Bartholomew & Co. There is no hill shading, but the principal heights are given in figures, and as all means of communication are very clearly shown, it is well adapted for the use of tourists. The new parish and county boundaries, as settled by the Scottish Boundary Commissioners 1891, are shown by colouring.

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Mittel Europa.—Topographische Spezialkarte von —. Scale 1:200,000 or 2·7 geographical miles to an inch. Herausgegeben von der Kartographischen Abtheilung der Königlich-preussischen Landes-Aufnahme. Sheets:—No. 13. Wenden; 119, Cranz; 120, Labian. Price 1s. 3d. each sheet. (*Dulau.*)

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21, 42; 23, 52; 24, 52; XXX. 15. 1, 30, 3, 4, 52, each 7, 42. Index 4d. This town is now complete in 42 sheets (coloured). Ormskirk (Lancashire). LXXXIII 16, 20, 42; LXXXIV 13, 21, 42; 23, 52; XCII 1, 6, 52. Index 4d. This town is now complete in 12 sheets (coloured). Prescott (Lancashire). CVII 7, 17 52. Index 2d. This town is now complete in 4 sheets (coloured). Rochdale (Lancashire). LXXXI 13, 16, 17, 19, 21, 52 each; 22, 42; LXXXVIII 4, 9, 10, 14, 52 each; 15, 112, 6d; LXXXVIII 8, 3 52; LXXXIX 1, 1, 2, 3, 54, each; 6, 82; 7, 112, 6d; 8, 52; 11, 112, 6d; 12, 42; 16, 42; 17, 112, 6d; 21, 42; 23, 52; 24, 42; LXXXIX 5, 2, 3, 52 each; 4, 6, 7, 8, 12, 13, 18, 52 each; 23, 42. Index 4d. Selby (Yorkshire). CCXXI 7, 16, 21, 22, 52, each; CCXXI 12, 3, 52; 1, 42. Index 2d. This town is now complete in 13 sheets (coloured). Skipton (Yorkshire). CLXVIII. 5, 12, 52. Index 2d. This town is now complete in 8 sheets (coloured).

Stanford, Agent.

ASIA.

Kiepert, H.—Carte Générale des Provinces Européennes et Asiatiques de l'Empire Ottoman (sans l'Arabie), dressée par Henri Kiepert. Scale 1:3,000,000 or 41·6 geographical miles to an inch. Deuxième édition entièrement corrigée et augmentée d'un Index Alphabétique. (Quatrième édition de la "Carte générale de l'Empire Ottoman en Europe et en Asie.") Berlin, 1892: Dietrich Reimer. Price 8s. [Presented by the Publisher.]

The present edition of this excellent map has been carefully corrected, and its usefulness increased by the addition of an alphabetical index, which contains all the names which appear on the map. The elevations and depressions are given in décimètres, and in cases where heights are only approximately known, the figures are contained in brackets. Although the title of the map is the 'Ottoman Empire,' it contains, in addition, a large portion of south-eastern Europe, and half of Persia. The manner in which it has been produced leaves nothing to be desired, and it is in all respects an excellent specimen of cartography.

Pamir u. d. Quellgebiets des Amu-Darja.—Übersichtskarte der —. Scale 1:2,500,000 or 34·4 geographical miles to an inch. Ges. v. Fr. Immanuel, Berlin, 1892. Petermann's 'Geographische Mitteilungen,' Jahrgang 1892, Taf. 8. Gotha, Justus Perthes. [Presented by the Publisher.]

Schuler, Hauptmann Eugen.—Dislocations-Karte der Indo-britischen Streitkräfte in Ost-Indien und der Russischen Streitkräfte in Asien, nebst tabellarischer Uebersicht der Organisation dieser Streitkräfte im Frieden und im Kriege. Bearbeitet und Sr. Exzellenz Herrn k. u. k. F Z M. Freiherrn von Beck, Chef des k. u. k. Generalstabes, ehrerbietig gewidmet von Hauptmann Eugen Schuler. Scale 1:7,500,000 or 102·7 geographical miles to an inch. With inset maps. Wien, Artaria & Co., 1892. [Presented by the Publishers.]

As its title indicates, this map is intended to show the positions and composition of British and Russian army corps in India and Asiatic Russia, as well as all means of communication. The map is accompanied by a table containing more definite details with regard to organization than can be given by the symbols employed on the map. In addition to the principal map three insets are given, showing the composition of British troops stationed at Aden and the Somali coast, of the Russian troops in the neighbourhood of Vladivostock, and a general view of the military stations of both nations in Asia. The symbols employed are well chosen, and with the aid of the copious explanatory notes given, are easily understood. The amount of work entailed in the production of this map must have been very great.

Sumatra.—Kaart der Tabaks-Ondernemingen in Langkat, Dell, Serdang, Bedagei, Padang, Batoo-Bahara, Arahau, Kwaloe, Bilah, Panai, Laboean-Batoo en Kota-Pinang. Oostkust van Sumatra. Scale 1:200,000 or 2·7 geographical miles to an inch. Vervaardigd naar topographische gegevens welwillend verstrekt door den Hoog Ed. Geatr. Heer W. J. M. Michiels, Resident van de Oostkust van Sumatra, en verder bewerkt door de Heeren P. de Vries et Zoon, Makelaars te Amsterdam. Uitgegeven bij J. H. de Bussy, Amsterdam, 1891. (Dulan.)

The extent to which tobacco is cultivated on the east coast of Sumatra, is very clearly shown on this map. Each estate is numbered, and its boundaries

are indicated. By referring to the index which accompanies the map, the name of any plantation, and its owner can be found. Eight insets are given, together with a full explanation of the signs employed.

AFRICA.

Afrika.—Spezial-Karte von —, im Massstab von 1:4,000,000 or 55.5 geographical miles to an inch, (10 Blatt), entworfen von Hermann Habenicht, bearbeitet von demselben, Bruno Domann und Dr. Richard Lüddecke. Dritte Auflage, III. Lieferung (containing sections 1 and 7). Gotha, Justus Perthes, 1892. Price 3s. (Dulau.)

Section 1 contains the Empire of Morocco, part of Algeria, and the west Sahara. The routes of all the principal travellers are shown, and the map is coloured to show the nature of the country. Section 7 embraces all that portion of western equatorial Africa situated between latitudes 0° 28' N. and 16° S. Both of these sheets are accompanied by letterpress, in which a list of the authorities consulted in their compilation is given.

Algérie.—Carte d' —, dressée et publiée par le Service Géographique de l'Armée. Scale 1:200,000 or 2.7 geographical miles to an inch. Sheet No. 5, Alger. Price 8d. (Dulau.)

Britisch-Betschuana-Land.—Der westliche Teil von — und die Kalahari Wüste. Nach Ortsbestimmungen und Erkundigungen entworfen von Edward Wilkinsson. Scale 1:1,750,000 or 23.9 geographical miles to an inch. Petermann's 'Geographische Mittheilungen,' Jahrgang 1892, Tafel 7. Gotha, Justus Perthes. [Presented by the Publisher.]

Tunisie.—Carte de la —, dressée et publiée par le Service Géographique de l'Armée, Paris. Scale 1:200,000 or 2.7 geographical miles to an inch. Sheet 6. Djebel, Achkel. Price 1s. 6d. Sheet 18, El Ayaicha. Price 8d. (Dulau.)

AMERICA.

Rand, McNally, & Co.—Pocket Maps and Shippers' Guides of Arizona (scale 1:1,108,200 or 23.4 geographical miles to an inch); Arkansas (scale 1:1,270,200 or 17.1 geographical miles to an inch); California (scale 1:2,533,100 or 34.7 geographical miles to an inch); Iowa (scale 1:823,440 or 11.3 geographical miles to an inch); Maine (scale 1:1,110,000 or 15.2 geographical miles to an inch); Maryland and Delaware (scale 1:759,200 or 10.4 geographical miles to an inch); Minnesota (scale 1:1,014,700 or 13.9 geographical miles to an inch); New Mexico (scale 1:1,168,000 or 16 geographical miles to an inch); New York (scale 1:820,000 or 11.2 geographical miles to an inch); South Carolina (scale 1:1,190,000 or 16.3 geographical miles to an inch); Utah (scale 1:1,394,300 or 19.1 geographical miles to an inch). Rand, McNally, & Co., Chicago. Price 1s. 2d. each. [Presented by the Publishers, through E. Stanford, Esq.]

These maps belong to an excellent series in course of publication by Rand, McNally, & Co., of Chicago and New York. By means of symbols attached to the names of places, a large amount of information is given that cannot fail to be of service to persons visiting the United States, either on business or for pleasure. With the assistance of the index which accompanies these maps, the nearest mailing point to any place on the map, the name of the Express Company doing business in the section, the position of the most convenient telegraph station, and other items of useful information can be found. Each map is folded in a size convenient for the pocket, and is printed on strong, thin paper.

Whymper, E.—Route Map to illustrate travels amongst the Great Andes of the Equator, by Edward Whymper. Scale 1:507,181 or 6.9 geographical miles to an inch. Stanford's Geographical Establishment. London, J. Murray, 1892. [Presented by the Author.]

This route map has been carefully constructed by the author, from angles taken with a theodolite from many points, the intersections of six, eight, and

in some cases, ten mys being used to insure accuracy in fixing the position of important objects or stations. La Condamine's latitudes have been used by the author to obtain a scale; these, however, were not depended on exclusively, and distances of 36,670 feet, on the eastern flank of Chimborazo, and 22,385 feet in the neighbourhood of Machachi were measured, from which the scale was taken in the first instance. As a very considerable amount of intelligent care has been shown by Mr. Whympcr in fixing the relative positions of the Great Andes of the Equator, and there is every reason to believe that they are now accurately located. Guayaquil has been moved a little to the west of the position assigned to it on the Admiralty Charts, the author's reason for doing so being that several captains who had been running between Callao and Panama for many years, informed him that they were convinced it ought to be shifted in that direction.

In addition to the principal route map, insets containing sketch plans of Chimborazo, part of the southern side of Chimborazo, and the vicinity of Cayambe and Sara-Urcu, are given. The heights, in English feet, are mostly from observations of the author; where this is not the case, those of Reiss and Stübel have been adopted, and are marked with their initials. This map will be of the greatest service to any one who may wish to attempt the ascent of the Great Andes, as Mr. Whympcr has carefully laid down his track on those of the greatest altitudes, and the ordinary traveller will also find it useful for reference, with regard to the routes, &c.

CHARTS.

United States Charts.—No. 1310, West Coast of Lower California, Corros Island to Abrejos Point. Surveyed by the officers of the U.S.S. *Ranger*, Commander E. A. Cook, U.S.N., Commanding in 1887-89, and Lieut.-Commander G. E. Reiter, U.S.N., in 1889-90. Price 4s. 2d.

ATLASES.

Universal Atlas.—The —, complete in 28 parts, including index. London, published by Cassell & Co., Limited, for the Atlas Publishing Co., Limited. Parts 12 and 13. Price 1s. each. [Presented by the Publishers.]

In Part 12, Sheets 17 and 18 contain the northern portion of a two-sheet map of England and Wales, on which the importance of the towns as regards population is indicated by symbols, and all railways and main roads are laid down. Sheet 83 is a map of Afghanistan and Beluchistan, on which a portion of the Russian possessions in Turkestan and Khiva are also shown, and the general relative importance of the towns is indicated by the character of the lettering. The remaining sheet is occupied by a map of Siam and the Malay Archipelago, with an inset map of Java on an enlarged scale, on which the positions of the principal mountains are indicated by numbers corresponding to those given in an index from which their names and altitudes in feet can be obtained.

In Part 13, a map of the world on Mercator's projection is given, showing the British Empire, the commercial routes of the world, and the ocean currents. There are also three insets, having reference to the routes, followed by the different steamship companies; the two remaining sheets are devoted to maps of the Caucasus, and Greece.

Saint-Martin, M. Vivien de.—Atlas Universel de Géographie, construit d'après les sources originales et les documents les plus récents, cartes, voyages, mémoires, travaux géodésiques, &c. Avec un Texte Analytique. Ouvrage commencé par M. Vivien de Saint-Martin, et continué par Fr. Schrader. 84 Cartes gravées sur cuivre sous la direction de MM. E. Collin et Delaune, No. 60, Afrique (en 3 feuilles), feuille Sud. Scale 1:10,000,000 or 137 geographical miles to an inch. Paris, Librairie Hachette et Cie. Price, 2s. each. *Dulaud*.)

This is the southern portion of a map of Africa, which is to be completed in three sheets. It is a beautiful specimen of cartography, and has been compiled

NEW MAPS.

from the most recent available material. The authorities consulted in its compilation are given, and on the cover of the map, a list of the maps that this atlas will contain is furnished; those which have already been published being distinguished from the others by an asterisk. From this it appears twenty-five maps have already been published, and fifty-nine yet remain. As it has been about eleven years in course of publication, and as only one sheet is now contained in each issue, it seems certain that very many years must elapse before the atlas will be complete.

PHOTOGRAPHS.

Grand Falls of Labrador.—5 Photographs of the ———. Taken by H. G. Bryant, Esq., of Philadelphia, in 1891. [Presented by H. G. Bryant, Esq.]

These interesting photographs of the Grand Falls, Labrador, and the scenery in their vicinity have been taken, and presented by Mr. H. G. Bryant, of Philadelphia, who, accompanied by Prof. Kenaston, of Washington, successfully accomplished the difficult journey from the end of canoe navigation to the falls, and spent sufficient time there to take accurate measurements of great scientific interest. The five photographs presented to the society are excellent specimens, and the views are remarkably well chosen for conveying an accurate idea of the imposing nature of the scenery.

Japan.—The Great Earthquake in ———, 1891. 29 Photographs (one showing Earthquake Effects in Manila and Italy). By John Milne, F.R.S., Professor of Mining and Geology, Imperial University of Japan, and W. K. Burton, C.E., Professor of Sanitary Engineering, Imperial University of Japan. [Published by Lane, Crawford & Co., Yokohama. Agent in England, E. Stanford. Price 2*l.* 2*s.* [Presented by the Authors.]

Most of these photographs were taken by the authors for the Imperial University of Japan, and have been published by permission of the President. Plates X. and XII. are by Mr. Miyashita of Nagoya, and Plate XIV. is by Mr. Nakamura of Nagoya, who have allowed them to be used in this album. All the photographs are well chosen to show the effects of the late earthquake, and each is accompanied by explanatory notes, which contain a large amount of information of scientific interest. The manner in which the photographs have been reproduced by Mr. K. Ogawa leaves nothing to be desired. The last plate exhibits the effects of earthquakes in Italy, in Manila, and at the end a sketch-map of Japan is given, on which the lines of volcanic action, and isoseismic lines are laid down.

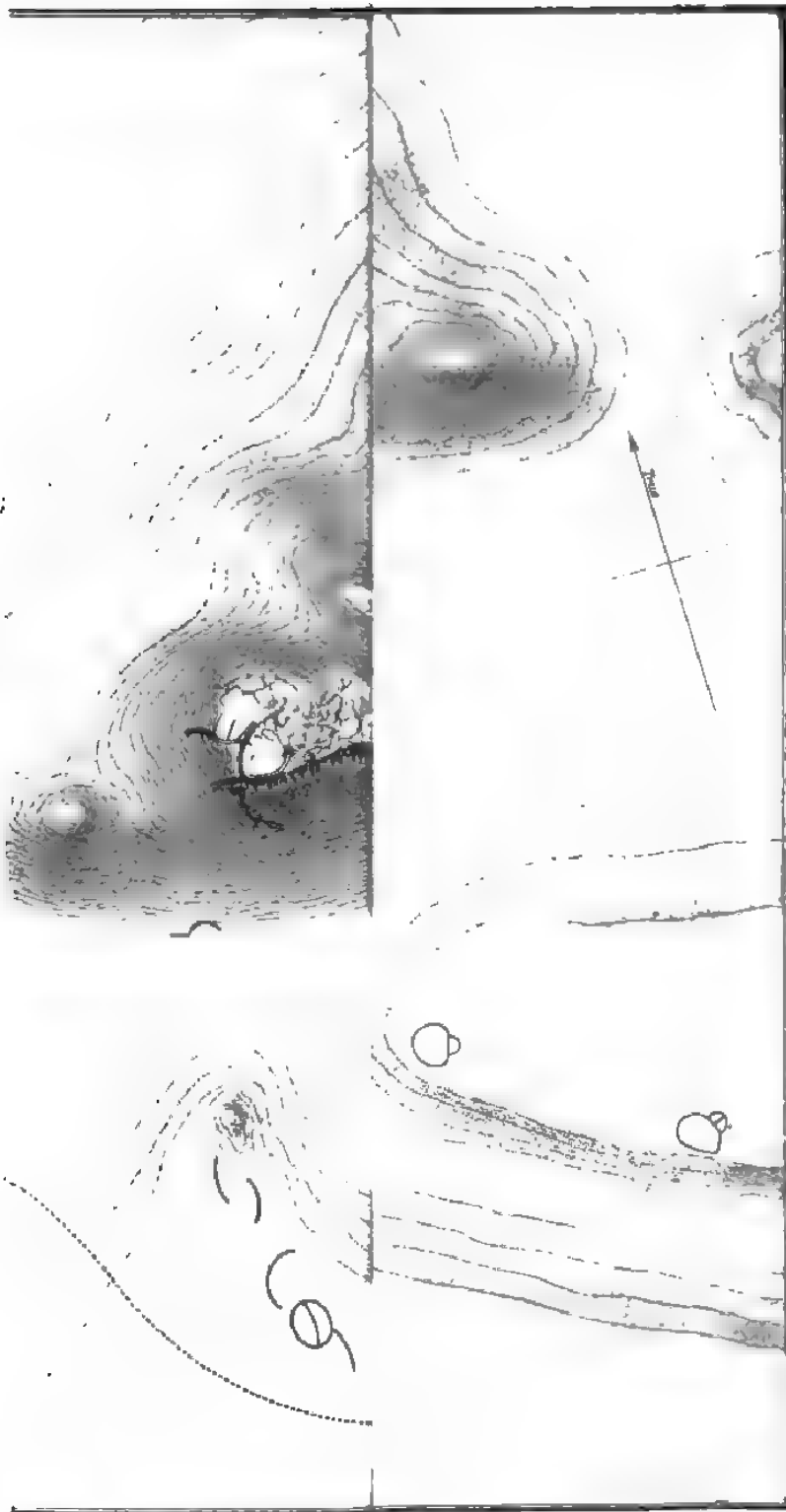
——— 6 Photographs of ———, showing Results of the recent Earthquake. [Presented by Rev. Walter Weston.]

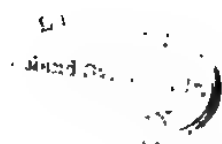
These six photographs were taken by a native photographer, and illustrate the effects of the late earthquake in Japan; they are as follows:—(1) Subsidence of the earth at Midori village, (2) Ruins of Saikoji Temple at Midori, (3) New lake at Midori, (4) Ruins of Tenjindo village, (5) The destruction of the rice-fields Kiabara at Tantasaka, (6) Ruins of Biwajima village near Nagoya. These are all excellent specimens of photography.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given. In response to this notice many valuable photographs have been presented; the collection, however, is at present far from being complete, one of its greatest deficiencies being the entire absence of any photographs of Asia Minor.









PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

The Annual Address on the Progress of Geography: 1891-92.

By the Right Hon. Sir MOUNTSTUART E. GRANT DUFF, G.C.S.I.,
President.

(Delivered at the Anniversary Meeting, May 23rd, 1892.)

I MUST begin my address of 1892, as I did that of 1891, by saying that the year which has gone by since our last Anniversary Meeting, which took place on the 15th June, has not been marked by any very startling geographical events. It has, however, like its predecessor, been a time of steady and useful work. The gradual diminution of sensational events is the measure of our ever-increasing knowledge of the planet on which we live, and a thing to be rejoiced in, not lamented.

In reviewing the work of the last year we may begin conveniently enough by noticing the chief occupations of our own Society.

EVENING MEETINGS.

We have had, in all, eleven evening meetings. At the first, which took place on June 29th, and was the concluding meeting of last session, a paper was read by Mr. Millson, on the Yoruba Country to the North of Lagos. It was full of interesting information about a district which has till recently been so cut off from its natural sources for the supply of articles manufactured in civilised countries, that when, in 1867, Kohlfs passed through the town of Ilorin, he found that the *tarbousses* of Vienna had a regular sale in its markets, though it was only 150 miles from the sea. Mr. Millson made it quite clear that trade has a very great future in this region, and that trade means the cessation or great diminution of the slave wars in the Hinterland. He observed:—"The isolation of the interior produced by the slave trade has, doubtless, been perpetuated by the fact that the trade which supplanted it is chiefly in the produce of the oil-palm (*Elaeis Guineensis*), a tree which does not flourish above a certain distance from the coast varying from 100 to 150 miles."

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On the same evening a short paper was read by Mr. Doyle, describing a journey from Manica to the Limpopo, to which additional interest was given by the fact that the two envoys of the chief known as King Gunguhana, who has a fighting force of some 20,000 men, of whom a tenth part are armed with the Martini-Henry, were present at the meeting.

The first meeting of the present session took place on November 10th, when a paper was read by Lord Lamington on his travels through the Trans-Salwin Shan States to Tong-King. After an agreeable journey from Bangkok he set out from Chieng Mai, the capital of the Laos country, in company with Mr. Archer, who was on his way to take charge of an expedition sent from Burma to inquire into and survey the frontiers between the Shan States and Siam. Ere long the companions separated, and Lord Lamington struck to the eastward through a territory not hitherto visited by Europeans, keeping a record of all he observed, and making a careful route-survey, whereby he added to our knowledge some 300 miles of new country. He emerged from the hitherto untraversed regions into the French possessions in Tong-King, and arrived eventually at Hanoi, whence he returned to Europe via Haiphong and Saigon.

At our second meeting, in November, Mr. Littledale's paper on the Pamirs was read in the presence of that gentleman and his wife by Mr. Freshfield, who prefaced it by some interesting remarks of his own. Mr. Littledale's communication brought to the minds of most of us a much clearer idea than we had before of an extraordinary country, the centre of the mountain systems of Asia. The Roof of the world has been hitherto very unfamiliar, but it may, should that unwisdom which the great Swedish Chancellor found to be the dominant factor in human affairs, guide the Councils of St. Petersburg and London, be eventually only too well known. Thus far, I am happy to say, the omens are prosperous, and we may look for better things.

In December, Mr. Hogarth, of Magdalen College, Oxford, gave us an oral sketch of an elaborate paper which will appear in one of our supplementary volumes, dealing chiefly with the passes of the Taurus and Anti-Taurus, with the very beautiful lakes Egerdir and Beysherer, and with the ruins of Adada, a perfect specimen of an Anatolian city of the Roman period. The eastern part of that region will probably yield very interesting results to the archaeologist, as Roman cities and public works have been exceptionally well preserved, because they have had to contend only against time, the country having been for ages almost depopulated. Much the same may be said of the Anti-Taurus, which was deserted by man from the 11th century until about fifty years ago.

This kind of intensive exploration will probably occupy more of our attention in the future than in the past, but I am sure we shall never lay ourselves open to the observation which was made by a friend of

mine writing lately from Athens, when he said that he thought that a discussion by certain societies there of such subjects as the use of the drain in the theatre at Eretria, approached a little too nearly the dissertations with which our youth was unhappily only too familiar, and to which the young lady alluded, who, urged by her father, an illustrious Hellenist, to marry a particular person on the ground that he knew more of the particle *ye* than any man in Oxford, replied that she knew too much of the particle *μέν*. What a pity, however, it is that explorations in classical lands are not once for all removed from the sphere of societies and undertaken by individuals. I talked the other day with a distinguished scholar about certain Americans, compared with whose incomes those of our greatest English nobles represent only genteel poverty. "But what could any one do," said some one present, "with such vast sums?" "I know what I would do," said my friend, "I would have all the classical sites dug up in my own lifetime." Just imagine how easily any of those gentlemen, whose names are barely known out of the United States, could leap into world-wide and everlasting fame by acting on such a suggestion as this.

Our next meeting was on the 25th January. The paper was by Mr. Charles Campbell, of Her Majesty's Consular Service in China, and contained an account of a journey which he had made from Seoul, the capital of Korea, to the east coast of that peninsula, and thence North to the Long White Mountain, an extinct volcano on the borders of Manchuria, from which streams descend to join the Sungari, the Tumen, and the Yalu. The mountain itself had been visited under more favourable circumstances by Mr. James and his companions from the Manchurian side, but no European had attempted to reach it from the Korean side, and in his journey of 68 days, during which he covered 1300 miles, Mr. Campbell passed through a good deal of country not known to geography. This paper led to an interesting conversation in which Captain Younghusband, who was one of Mr. James's companions, Mr. Charles, and others, took part.

Both our meetings in February were particularly well attended, and the second was the largest gathering we have had since the one in the Albert Hall in May, 1890. At the first, Captain Younghusband read a paper on his two difficult journeys from India to the northward, especially interesting in so far as they concerned the Pamirs, though he preserved all that reticence with respect to international matters which became a rising member of the Indian Political Service. Mr. Theodore Bent was the central figure of our last meeting in February, safely returned from his explorations in the gold-bearing regions of South Africa, to which he had brought the same zeal and intelligence which had already distinguished him in the Cyclades, in the Bahrein Islands, and in Cilicia. He has not yet been able to gratify our curiosity further as to the period of the world's history, at which the

ruined fortresses he went to examine were raised, than by saying that he believes them to have been the work of people from Arabia, before the time of the first preaching of Islam, but we may hope for some further light when the numerous antiquities which he has brought to England have been carefully examined.

At the meeting of the 14th March, we had a paper by Mr. Garrett, on the country behind Sierra Leone, which he had traversed in various directions, crossing on one of his journeys the upper waters of the Niger. Whether from modesty or official reticence, Mr. Garrett by no means did justice to his own achievements; but this omission was supplied by Mr. Griffith, the present Governor of the Seychelles, and formerly Colonial Secretary in Sierra Leone, who briefly, clearly, and well, explained some of the important political motives which had induced the authorities at Freetown to send Mr. Garrett on more than one really arduous and dangerous journey.

The meeting of March 28th took us to Peru. Mr. Ross read a paper on that country, which gave rise to an interesting conversation in which Mr. Markham, the Peruvian Consul-General, and others, took an effective part. Mr. Ross went out in the service of the Peruvian Corporation to report to it on the prospect offered by the lands near the head waters of the Ucayali for planting operations, and formed a very high opinion indeed of their capabilities.

On April 11th we had a paper read by Mr. Ernest Gedge, giving an account of an expedition undertaken by Captain Dundas up the 'Tana river in British East Africa; not, it would appear, a specially interesting stream, but one which will doubtless some day play a part in civilising the region through which it flows.

A paper on Imèrina, the central Province of Madagascar, by Mr. Sibree, who has already published a great deal in connection with that island, agreeably occupied our meeting of May 8th. Both Mr. Pickersgill, a member of the Consular Service, and Canon Tristram made good speeches after the paper was over, whilst Sir Rawson Rawson, by recalling the tragic accounts which he had heard of the persecutions in Mauritius between forty and fifty years ago, brought home to us very clearly the great and beneficial changes which a generation and a half had made. Mr. Sibree is a missionary attached to the London Missionary Society, and so is also, I believe, Mr. Baron, who has done so much for the Botany of Madagascar. I wonder if it has ever occurred to any one what a very interesting book might be written about the useful secular work done by missionaries of all sorts and kinds, Catholic, Protestant and what not. If the religious element were carefully eliminated and perfect justice done to all creeds and colours it ought to be a successful one.

It has appeared to me this year, as last, that the recently introduced practice of having a gathering after our meetings in the next room, at

which interesting objects in connection with the papers read are shown, has been agreeable to members.

We have once more, most cordially, to thank the Senate of the University of London for its kindness in allowing us the use of its theatre.

'PROCEEDINGS.'

The publication of our 'Proceedings' has been regularly continued, and they have contained a number of important papers over and above those which have been read at our evening meetings. I may mention Mr. Miller Christy's answer to the question "Why are the prairies treeless?"; Mr. Freshfield's review of explorations in the Central Caucasus in 1890, which contains the important suggestion that a Caucasian guide-book should be prepared on the plan of Mr. John Ball's 'Alpine Guide,' or Ford's 'Handbook for Spain'; Colonel Holdich's paper on 'The application of the Indian system of Geographical Survey to Africa' and an article by Mr. Markham in our May number on the discovery of the Galapagos Islands.

A considerable number of important books have been noticed in our 'Proceedings' during the course of the year which I am reviewing. Such were the memoirs of the service in the Sudan of Romolo Gessi Pasha, the friend and officer of Gordon, who cleared up some points with reference to the infant Nile which had been left uncertain by his predecessors. Such were Dr. Junker's travels in the interior of Africa during 1885-6, and Dr. Schinz's work on the little known country belonging to the Germans in the south-western part of that continent.

Such, too, was 'The Land of the Lamas' by that most meritorious and only too modest traveller, Mr. Rockhill, and a book which appeals more to the general and less to the purely geographical reader, Sir Edwin Arnold's 'Letters from Japan.'

The travels of Captain Binger from the Niger to the Gulf of Guinea have also been noticed, and deservedly, for they have caused another portion of the map of Africa to pass from the unknown into the known. The journey of Prince Henri d'Orléans and M. Bonvalot across a considerable portion of Tibet, found a sympathetic reviewer in that indefatigable student of geography, Mr. Delmar Morgan; and Mrs. Bishop's journeys in Persia and Kurdistan, where she suffered hardships which would have broken down many strong men, were also brought before the notice of the Society.

Señor Asensio's 'Life of Columbus' is probably the best account of that famous personage which has yet appeared; but the chief contribution of 1892 to geography, reviewed in our 'Proceedings,' is assuredly Mr. Whymper's beautiful work on the Equatorial Andes.

Among papers read before foreign societies, and which have been abstracted during the year in our 'Proceedings,' none struck me more

than one about India, read on June 4th of last year at Berlin, by Dr. Bastian, and another, which brought out the fact, known, I suppose, to very few of us, that there is one Parliament in the world, that, viz. of Surinam, which consists of 15 members, 13 of whom are Jews.

MISCELLANEOUS DUTIES OF THE SOCIETY.

With our meetings all Fellows of the Society who live in London, and with our 'Proceedings' all Fellows of the Society, may be taken to be more or less familiar, but our Fellows by their contributions do a great deal more for their science than to make it possible to hold meetings and to publish 'Proceedings'; nor does it seem unadvisable to remind them, from time to time, what they are doing in other ways for science and the body politic. They are aware that an annual vote of 500*l.* is taken in the Estimates in aid of the Society's finances. In return for that it is bound to keep open for the public at large, and does keep open, a map collection of great importance. During the last year some 2500 persons visited the map room, which is in charge, as you all know, of Mr. Coles, a most competent officer; but if we had more room we could be much more useful. We could for example store, in such a way as to make it quite easy to refer to them, all the 25-inch Ordnance Survey Maps. That at present is perfectly out of the question. We should like also, if we had the space, to have a room where any Member of Parliament or person holding an official position could at once be supplied with all the information he could desire upon any of the innumerable questions where politics and administration cross the frontiers of geography.

Another of our duties is to collect and keep together a large collection of books, maps, diagrams, photographs, and other helps to Earth-knowledge. Of the first of these we may have about 40,000, valued at not less than 10,000*l.* Of the second and third, about 50,000 maps and charts and 7000 atlases; and of the fourth about 4000 copies, together valued at about 8000*l.* We keep, too, a stock of instruments, which we lend from time to time to travellers who satisfy us that they can use them; 680*l.* worth of these have been lent to Government officials since 1888.

A further department of our activity is map-making. Of course ordinary map-making can be done, and is done for profit by a variety of firms which have adopted that line of business; but with the best will in the world these people are obliged to leave on one side a great deal of work which would be most useful to the public, simply because it is utterly unremunerative. We have recently produced a large-scale map of East Central Africa, as well as maps of Persia and Tibet, edited respectively by Mr. George Curzon and General J. T. Walker, while we are constantly publishing in our 'Proceedings' original maps which,

but for us, would never see the light at all, or if they did, only after an amount of delay which would greatly impair their usefulness.

The same officer who presides so well over our map collection renders very useful services to the public, by giving instruction in surveying and practical astronomy to persons who are going into countries the geography of which is little known. Forty-eight servants of the Government, soldiers, sailors, and others, of whom twenty-one were employed on special service and boundary commissions, have recently taken advantage of this teaching. We receive too as students, at the desire of the Colonial Office, all officials who come to us before going out to West Africa, and pay half their fees, while our advice and help is always at the disposal of any of the Government Offices, which desire to consult us on the choice and purchase of instruments. I need hardly say that many private individuals before going on their travels avail themselves of the opportunities afforded to them by the Society, to study not only surveying and the use of instruments, but botany and geology.

Another very important function which our Fellows enable the Council to fulfil, is the granting of direct subventions to intending explorers, and you all know what large sums have been given at various times for such purposes.

Few occasions have, however, arisen during the past year for contribution on the part of the Society to geographical research. I mentioned last June our assistance given to Mr. Ramsay and Mr. Theodore Bent. You will have gathered from what I have already said that this assistance has been productive of excellent results, and we have just supplemented the grant to the latter by a contribution towards the expenses of Mr. Swan who accompanied him, and did some good geographical work. Mr. Conway, a most experienced mountaineer, and a man of large scientific knowledge, started in the beginning of this year to explore the glaciers of the Karakorum. He received from us 250*l.* towards his expenses, and a conditional promise of more.

To Mr. Pratt, who read at one of the Society's meetings a very valuable paper on North-western China more than a year ago, and who is now going through the regions, first clearly revealed to science by Mr. Bates in his delightful 'Naturalist on the Amazona,' to explore the still unknown or little known regions in the extensive valley of that great river, we have given a grant of 100*l.*, and have lent him instruments. If he adds considerably to geographical knowledge, our contribution may be increased at a later period.

We have given a small grant in aid of a proposed enquiry into the Houssa language and people. We have also put a small sum at the disposal of Mr. Mackinder to enable him to buy in America any things which he may think likely to be of use to the Society.

To Dr. Nansen we have voted 300*l.* The object of his expedition, it should be remembered, is not so much to reach the North Pole, as to explore

the unknown Arctic region. This he proposes to effect not by following the coast line of Greenland or Franz Josef Land, which might be the best plan if their coast lines extend much beyond the points already known; but to reach the edge of the hitherto untravelled region by the help of the surface currents which he believes cross the polar region from Siberia towards Greenland. The Norwegian Parliament has voted a sum of money towards the expenses of the expedition, but it is not large, and our contribution may help to the better equipment of what may possibly turn out an important enterprise, one which can at least hardly fail to add something to human knowledge.

I may just remind the Fellows of the publication from time to time of Supplementary Papers which are not sent to their addressees like the 'Proceedings,' but which can be procured by any of them gratis on application.

The principal part of to-day's business makes it unnecessary for me to say anything as to what they enable the Council to do in the way of rewarding valuable work performed for the advancement of our science.

In the beginning of the year we published a Circular prepared by the Orthographical Committee of the Council upon the spelling of Geographical names. This was done in pursuance of the policy announced in the 'Proceedings' for 1885, page 535;—a policy in which we were encouraged by observing that the charts and maps issued during the last six years by the Admiralty and War Office have conformed to our views; that the Foreign and Colonial Offices have done the same, and that the Government of the United States of America has adopted a very similar system.

The death of Mr. Bates rendered vacant the office of Assistant Secretary, and the Council felt sure that it would consult the best interests of the Society by promoting to that position our late Librarian, Mr. Keltie, who was made at the same time Editor of the Society's publications. The vacancy caused by this promotion was filled after a very careful consideration by the appointment of Dr. H. B. Mill, who has done much already for Scientific Geography. Our cartographical department has been strengthened by the accession of Mr. Darbishire, a highly promising pupil of Mr. Mackinder's at Oxford, who has also had an excellent German training.

The Council has requested three gentlemen, well known to the Society, to represent it at one or other of the Congresses to be held at Madrid, in the neighbourhood of Huelva, and at Genoa, in honour of the fourth centenary of the discovery of America by Columbus.

The attention of many I address was doubtless called to the Congress at Berne, where, by the way, England "was conspicuous by its absence" in the Educational Section. A strong wish was expressed there that the next Congress should meet in London, and the necessary

steps have been taken to comply with that wish. A committee, of which Major Darwin is the head, is now engaged in initiating arrangements for a Geographical Congress to be held in 1895. This committee is not a committee of the Council, nor has it any authority to expend money or incur liabilities on account of the Society, but it has authority to make all preliminary arrangements needful for the holding of the Congress, and to submit to the Council from time to time any proposals involving expenditure to which it might desire the Council to contribute.

OUR EDUCATIONAL WORK.

Hardly inferior in importance to the duty of assisting well-considered exploration and supplying true explorers with an audience to applaud their discoveries—a duty laid upon the Society by all its past—is the duty laid upon it by the necessities of the present to assist in the wider diffusion of geographical instruction. The member of our body who did most to turn our attention to the improvement of geographical education was, as many of you are aware, Mr. Francis Galton, who early in life distinguished himself by a journey in South-western Africa and by his valuable and still highly appreciated book called the 'Art of Travel.'

In our attempts to increase the amount and improve the quality of geographical teaching in the country we had to put up with some grievous disappointments. We began as far back as 1869 by giving medals, to be competed for by the principal English schools. Two schools, and two only, distinguished themselves in the competitions—Ibstock College and Liverpool College. As to the fourteen others, the less said the better.

The Society, however, had no idea of allowing itself to be beaten by the *vis inertiae* or *lâcheté* of individuals. Mr. Freshfield, one of our honorary secretaries, himself an Etonian, was possessed with a perfect passion for giving to others the advantages in respect of geographical instruction which he had not enjoyed in boyhood, just as another Etonian, Sir John Lubbock, has been foremost in the struggle to introduce into schools that scientific teaching of which he never received any while *in statu pupillari*. Mr. Bates, our late excellent Assistant-Secretary, pondered long, as was his wont, as to whether we ought to throw a substantial portion of our strength into improving education, and having come to an affirmative conclusion, took the matter up with characteristic energy. The Council was of the same mind, and ere long it was determined:—

1. To send Mr. Keltie to report upon geographical teaching at home and abroad.
2. To open, under the auspices of the Society, an Educational Exhibition, in which all the best appliances for the teaching of geography should be brought together.

Mr. Keltie accordingly commenced his investigations, travelling very widely while he carried them into effect. His Report was published, and excited much attention. The Exhibition was open during December 1885 and January 1886, and was visited by several thousands of persons interested in education. The collection contained in it has been lent to the Teachers' Guild, and is now exhibited in the museum of that body in Gower Street.

In connection with the Exhibition a series of four lectures was delivered by Mr. Ravenstein, Mr. Keltie, Professor Bryce, and Mr. Moseley. They were published in one of our supplementary volumes, and are well worth studying. Lord Aberdare, who so long and so admirably guided our fortunes, also called attention to the subject of geographical education, in his Presidential Addresses for 1884 and 1885, and Lord Lorne treated of it at some length in 1886.

The movement thus inaugurated resulted in various changes in our policy. We concluded a treaty with the University of Oxford in 1887, and with Cambridge in 1888, by which it was stipulated that we should go shares with each of these learned bodies, in paying the salary of a lecturer to teach geography to such of their members as choose to avail themselves of his services, greatly aided in this by the fact that one of the most deservedly influential of the Heads of Houses at Oxford, the Warden of Merton, had been for many years a most assiduous and valuable member of our Council.

An argument, if it deserves the name, has sometimes been advanced, to the effect that we should not teach geography at our Universities, "because it is a graphy and not a logy!" Such things, if they are to be taken as a joke, are well enough. We have many of us no doubt smiled at the reply of a great lady to her husband. She said one day to him, "Everybody has his ology." "I don't think, my dear," was the reply, "that I have any ology." "Yes," was the rejoinder, "yours is tantology." When, however, such pleas for unreason are advanced seriously, we cannot laugh.

Solvitur ambulando! Throughout Germany the question has been settled. In that country, as well as in Austria and elsewhere, professors of geography are lecturing, and lecturing to excellent purpose without interfering either with the domain of their historical colleagues on the one side or their geological colleagues on the other. Whether it is taught or not taught in schools and Universities, geography must in the nature of things rule the territory in which the sciences relating to organic life, from history down to the structure of the humblest animate thing, meet the sciences which have to do with inorganic nature. Call it a "graphy," or a "logy," or a "Kunde," or what you please, it remains the body of knowledge which has to do with the theatre of the activity of man and all things that have life. We may stunt and injure the activity of the next generation by refusing to teach it, but eventually

it must obtain the position which the greatest of living systematic botanists claimed for it in 1886. "It must permeate," he said, "the whole of education to the termination of the University career, every subject taught having a geographical aspect."

When, in spite of foolish objections, we had sown the seeds of what we may hope, having regard to the slowness with which trees grow in our English climate, to be vigorous saplings about the end of the century and respectable denizens of the forest in the year 2000, we turned to the training schools and concluded a convention with the Education Department, whereby we engaged to give certain scholarships and prizes to such of their students as were reported by the Inspectors of Schools charged with the conduct of the examinations, to be worthy of those distinctions. The results for this year have been prominently brought before you in an earlier stage of this meeting.

Then, further, we entered into arrangements in 1888 with the directing Delegates of the Oxford University Extension Lectures, by which we agreed to give, on certain conditions, a yearly grant of 60*l.*, in aid of geographical teaching.

We have resolved to set on foot regular courses of geographical lectures in London, which will commence probably next November, and be given by Mr. Mackinder and other competent geographers.

Our very latest measures for the improvement of geographical education have been:—

1. To agree to some modifications in the distribution of the prizes to the training colleges which the officers of the Education Department advised, and which will better promote the object which the Society has in view.

2. To co-operate with the Manchester Geographical Society in assisting the governing body of the Victoria University to introduce geographical teaching into the curriculum by making a substantial grant for that purpose.

3. To award a travelling scholarship of 100*l.*,—our share being 50*l.* after an examination held at Oxford. This was gained by Mr. Grundy, who was bound, under the conditions prescribed, to travel for at least three months in one of a number of districts from which he might take his choice, and communicate the results to us. He has selected Boetia, and will, I make no doubt, furnish the Society ere long with some valuable information.

We continue the prizes given at the Oxford and Cambridge local examinations, and to the boys of the training ships. These belong to the same period of our history as the Public School medals, but with them we have been more successful. We are in correspondence with the Scotch Education Department as to the best method of further encouraging geographical study on the other side of the Tweed, where it has long been comparatively popular.

It seems to me quite certain that this part of our activity will fill a larger and larger space in the thoughts of all of us for a long time to come. The day will arrive when it will be of very little importance. Common sense has a way of conquering in the end, and the proposition that it is highly desirable for intelligent creatures inhabiting this planet to have a good general notion of the opportunities which it affords them is so self-evident, that one would think it did not require a very numerous and powerful Society to urge its general acceptance upon the scholastic world. Just look, however, at the labour it has cost to make even the very small advance we have made in this direction. It is hardly possible to exaggerate the difficulty of struggling against the customary, even when it is demonstrably absurd; and there are hundreds of people going about loose and without keepers who will tell you that it is infinitely more improving to a boy's mind to be unable, after years of labour, to read with pleasure the simplest Latin author than to obtain, with only a reasonable amount of pain and grief, a sound knowledge of geography.

In the month of February I delivered an address to the Royal Historical Society on the place of history in education. Much that I then said would have been quite germane to my present subject, but I must not yield to the temptation of re-stating it here at any length, because there are many other topics which it is my duty to pass in review. Still it is necessary to re-traverse some of the same ground, for indeed history and geography, geography and history, are brethren, who ought to be as closely allied as Castor and Pollux; each is absolutely necessary to the other, and, strange to say, this country, which has at least as much reason as any other to study history, and more than any other to study geography, is just the country in which least attention is given to them. They are relegated to a subordinate place in almost all our schools which consider themselves to belong to the first or second rank, while the utmost prominence is given not to reading the classics, to getting thoroughly imbued with classical ideas, and to having the mind filled with whatever of good and great the ancient world has bequeathed to us, but largely to accomplishments in the way of turning out pretty pieces of verse or prose, in the ancient tongues, which bear much the same relation to serious intellectual pursuits as do to the proper works and ways of an intelligent dog the art of jumping through a hoop filled with paper, or that of balancing on his nose a piece of biscuit till he is told that it is "paid for."

Educators who have given the best years of their lives to these accomplishments naturally abhor the idea of diminishing their importance, and when they are asked to find a reasonable place for history and geography in their schools they piteously point to their time-tables and say, "How are we to manage it?" Manage it by the elimination of rubbish. Put composition in the ancient tongues as a piece of regular "school business" behind the fire, and greatly diminish the amount of

time given to learning by heart in the interest of Latin and Greek composition. I dare say there are many people present who, in the interest of those valuable pursuits, have had to repeat a Greek play straight through, with many other acrobatic feats of the same fatuous kind. Eliminate nonsense, I say, and there will be ample time; to read a great deal more of the classics than is read now, and to teach quite as much history and geography as any one wishes to teach a boy under 18 or 19.

Even if fair Latin and Greek composition were turned out by the majority of boys who go through the classical mill, what would the gain amount to? But everybody knows that not one in ten ever does turn out composition that is worth anything, and yet what hours and hours that might have been given to geography and history, not to mention other equally good things, are sacrificed to such folly.

If young men develop a taste for writing Latin or Greek when the more important parts of classical learning have been fairly mastered, why should they not be encouraged by prizes? Who objects to fencing or to the artist "*qui elegantem gladii artem docet*," as they say at Leyden? but let us have swimming and riding first.

Neither geography nor history will ever obtain their proper position in education until we can get rid of the superstition as distinguished from the religion of the classics. No reasonable man who has a competent acquaintance with the subject can tolerate the idea of the classics being neglected. They form a most important part, and must always continue to form a most important part of literature, and literature is for a large class of minds a most excellent training. For a great many minds, however, it is not an excellent training, and to a considerable proportion of those susceptible of being trained by it the ancient languages present no attractions. Use the classics, I say, for their proper work. Train through them the *élite* of those capable of a literary training, but allow the far more numerous class which will never get any good out of them to apply itself to other more congenial, and for them more educative, as well as more instructive studies. I should like to appeal personally to the members of this very large and important society, numbering as it does thousands of heads of families belonging almost entirely to the leisured and professional classes, to the very flower of English life. There are few of us whose sons have not received, or are not receiving, a classical education. Well, with how many has it succeeded? How many, I mean, are being better trained, or even nearly as well trained, by it as they could have been in other ways? Yet so enormously powerful is the system that very few have been able to emancipate themselves from it. I do not deny for a moment that progress has been made in the last 30 years, but the very fact that it should be necessary to repeat in 1892 what I am now saying shows how very partial that progress has been. The views which I am stating

as the President of this great organisation, ought to be mere truisms and commonplaces, things so universally admitted that it is not worth while talking about them.

It is quite easy to explain how classics came to have the place in English education which they have so long held. What on earth was there to teach boys at school in the days of the Renaissance, if you did not teach classics? Mainly nonsense. When much later, one of our great Universities gave so prominent a place to mathematics, it did well. Things were better by that time than they were in the days of the Renaissance, but half the most important sciences which we have at the present day were not born. A great many more were in a mere embryonic condition. Imagine the difficulties that would have stood in the way of a teacher who wanted to give a prominent place to history and geography in education, in the days of Queen Anne. It would have been practically impossible. Teachers did perfectly right then and long afterwards to stick to classics and mathematics; but we are not living in the days of Queen Anne, but in those of another Queen, with regard to whom it was said in the seventh, and may be repeated with much fuller meaning in the fifty-fifth year of her reign:

"The land it boasts its titled hosts—they cannot vie with those,
The merchants of old England—the seignours of the seas;
In the days of Queen Victoria, for they have borne her sway,
From the far Atlantic islands to the islands of Cathay;
And o'er one-sixth of all the earth and over all the main,
Like some good fairy freedom marks and blesses her domain."

A practice, however, which can be historically explained is not necessarily justified. It may have been introduced, probably often was introduced, by the foremost men of the time, but they would be the very people who would be most horrified by it, if they could come back and see it at work under entirely new circumstances.

I allow that there are minds for which the classics form an admirable training. I allow that there are minds—the minds of a particular class of geniuses—for which mathematics form an admirable training. I allow that there is another considerable class for whom they are, perhaps, the only possible training, the class, namely, to which a gentleman belonged who was described more pithily than courteously by Auguste Comte when he was examining at the École Normale as "Stupide brute algébrique"; but I maintain that for a great many minds geography and history, well and carefully taught, would be much more educative than the two studies which as late as the time at which I took my degree, not quite forty-two years ago, almost absolutely monopolised attention in Oxford and Cambridge. Then, too, we must remember that while for everybody classics are mainly educative, and in a much less degree instructive, and while mathematics are instructive in a high degree only to those who are going into any of the no doubt numerous careers for which they are

essential, geography and history are instructive in a very high degree to all, even to those to whom they are not educative.

Mr. Matthew Arnold, not too complimentarily, divided his countrymen into Barbarians, Philistines, and Populace. It would seem that in the very important matter of geography large portions of what he called the Populace are being much better educated in Board Schools than their social superiors. Might not the expediency of "levelling up" be considered for the benefit even of the Barbarians?

In attempting to improve the geographical education of the country I think we ought always to remember the saying, "*Le meilleur tue le bien.*" At Oxford and Cambridge and at other centres of university life, it is most desirable that we should have as professors men who could hold their own with the most distinguished of the Germans, but that is a counsel of perfection. The teaching of these distinguished men would, no doubt, filter down through the highly-educated portion of the community to people who do not think of prolonging their regular and formal education beyond 18 or 19, but that would be a slow process. What I think we as a Society should keep chiefly in view is to try to have a clear and connected account of the leading facts which are known about the theatre of man's activity, together with an intelligent idea of the leading causes which have brought those facts about very much more widely extended through all ranks than they are now. We must keep our aims moderate in geography, as I have counselled our younger sister to do in history. There are undeniably a few persons to whom both studies, teach them as you will, are thoroughly abhorrent. Well, teach the very minimum of them to such people. I suppose they ought at all hazards to be taught that York is not the same as New York, and that the Greeks and Romans did something for human progress; but make all reasonable allowance for idiosyncrasies. I once knew a man, and a very distinguished man too, who had been a Cabinet Minister, and had occupied many other important niches in life, who used to say that all music was divided into two tunes, the one was "God Save the Queen," and the other was not. No reasonable teacher would have tried to cultivate him by music. I knew another man even more distinguished, to whom everything tasted like bread and butter—one would not have tried to make him a Brillat-Savarin! You cannot mention almost any study that is not detestable to somebody. Do not then waste time by teaching it unless it is absolutely and transparently necessary like the three "R's." A large number of people can be cultivated, and very highly cultivated, better through geography and history than anything else. All I ask for is that in the education of such people these two sciences should play a very much larger part than they do now. I think that if we could see some thoroughly good handbook of physical geography and another of political and commercial geography made part of the teaching of all secondary schools, and a subject of the leaving examination which should

be borrowed from Germany, if we continue to hold up a very high standard of professorial teaching in our subject, while we at the same time persist in the other lines of educational activity to which I have alluded, we should have done a good deal; but it is far from improbable that we may ere long see our way to giving further stimulus to sound geographical teaching in various parts of the country. The Society, however, may be assured that we will remember the maxim *festina lente*, and not waste the resources with which its members supply us in any rash experiments. I have sometimes thought that we might come to an understanding with the Royal Historical Society, a smaller and younger, but increasingly active body, for joint action in some directions. Geography is rooted in the physical sciences, and makes each of them tributary to her, while history, which is not rooted in geography, and which does not learn from geography all it has to teach about the existing conditions of man's dwelling-place, is simply bad history. An *amens cordiale* with the Geological and with the Linnean Society in the educational field, seems to me equally within the range of legitimate aspiration and effort.

Satisfactory reports of the year's work have been received from Mr. Mackinder, the Reader in Geography at Oxford, and Mr. Buchanan, the Lecturer at Cambridge.

These I think are the chief matters directly connected with our own work which it seems necessary to mention, our financial position, which you will, I think, consider satisfactory, being sufficiently described in the 'Report.'

Meantime we are happy to see other Geographical Societies springing up and prospering in different places. This year has seen one started at Liverpool, with no less a person than Lord Derby for its President. Liverpool is surely a most natural place to be the seat of a Geographical Society. An intelligent Catholic priest mentioned to me recently that one of his brethren settled in that city had told him that the want of open spaces there drove the children of the humbler ranks to use the docks as a playground, thereby bringing them into relations with ships and sailors, very much to the advantage of their geographical knowledge.

Another Geographical Society was established a few months earlier at Lima, where Science appears to be sharing in the recovery which has followed the calamities through which Peru has been passing in recent years.

THE YEAR'S EXPLORING WORK.

I have dealt at such length with the work of the Society and with matters of general geographical interest, that I must refer with more brevity than usual to the exploring work of the past year. To some of the more remarkable expeditions brought under the notice of the

Society during the year, I have already alluded; and it will be seen from what follows that the work of exploration is becoming more and more specialised.

In the Caucasus, Herr Merzbacher, with Herr Purtscheller, despite serious obstacles arising from the weather, succeeded in making the second ascent of Tetnuld; visited all three peaks of the Leila, and ascended the second and highest peak of Dongusorun. They also climbed Elbruz and Adyrso Bashi, while Herr Merzbacher and his friends ascended Kasbek, and made the first ascent of Gumaran Choch, 15,672 feet. He took many photographs and observations.

In Iceland, Mr. F. W. W. Howell succeeded in ascending the Orrefa Jökull in August last, the first time the summit has been reached.

In Asia there has been as much activity in the past as in previous years.

The publication, since our last anniversary meeting, of the figures of the Indian census of 1891, is an event which should not pass unnoticed. The grand total of all India, including Upper Burma, is now 1,587,104 square miles, with a population of 286,696,960. Of that, 944,108 square miles, with a population of 220,529,100, are directly under British rule; while 642,996 square miles, with a population of 66,167,860, is ruled by us indirectly, through a very large number of native chiefs of all degrees of power and rank.

I remember when the best guess that the best authorities on the subject could make, little more than twenty years ago, was that the total number of our Indian subjects was about 200,000,000; but everyone in those days immensely underrated the population of Bengal, which is so thickly peopled, that on an area of only 9000 square miles greater than the Presidency of Madras, it has as nearly as possible twice its population, great as that population is; for the population of Madras is now considerably over 35,500,000, having gone up some four millions in a single decade.

As will be seen from the report which will be published in the same number of the 'Proceedings' as this address, the Indian Survey accomplished a very considerable amount of geographical work in 1890-91.

The operations which are almost continuously carried on along the extensive Indian borderland certainly conduce to the acquisition of geographical knowledge, though, unfortunately, that knowledge is not made as available as it might be made, without the very slightest inconvenience to the public service. Your Council is in correspondence with the Indian Authorities as to this subject, on which I may again have to address the Society when the views of the Government of India and of the India Office are fully known to us.

Captain Wahab, who accompanied the last Black Mountain expedition.
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tion, succeeded in accomplishing a survey of 160 square miles, and a reconnaissance of 300 square miles.

According to the latest information, Mr. Conway and his party had nearly reached their basis of operations, for the exploration of the high peaks and glaciers of the Korakorum range, from which so much is expected. Mr. Conway and his party arrived at Gilgit on May 7th, and were about to climb the Rakipushi peak, which is 25,560 feet high.

At the end of 1890 and 1891, an expedition was sent from Bhamo northwards, along the banks of the Irawadi. It was commanded by Lieutenant Elliot, Assistant-Commissioner, and accompanied by Major Hobday, of the Indian Survey Department. Lieutenant Elliot's report and Major Hobday's map form a very solid contribution to the knowledge of the Upper Irawadi region, and the interesting Kalchin tribes that inhabit the north-east frontier of Upper Burma. The total area reconnoitred was roughly 3000 square miles, besides 1000 square miles mapped by sub-surveyor Sher Shah. Major Hobday believes the course of the 'Nmai Kha to be not much longer than that of the Mali Kha (both feeders of the Upper Irawadi), and he thinks that the 'Nmai Kha cannot receive the Lu river of Tibet, which he believes must be the source of the Salwin river.

Lord Lamington's journey last year, already alluded to, embraced a section of some 300 miles through the Northern Shun states, from Muang Sing to Ba Na Sien, which, so far as is known, had not previously been traversed.

The two valuable papers by Mr. St. George Littledale and Captain Younghusband have already been mentioned. They deal with journeys made in 1890, and therefore hardly come within the scope of a review of the past year. Still the publication of the narratives has contributed materially to our knowledge of a region of great interest both geographically and politically, and has brought into prominence the fact that the Pamirs are not one compact tableland, but a vast congeries of lofty mountains and deep valleys. Another Pamir explorer, Captain Bower, has, starting with Dr. Thorold from Leh in June 1891, succeeded in crossing the widest part of the Tibetan plateau, from Ladak in the west towards Chiamdo in the east. Captain Bower has thus traversed one of the most important of the hitherto unexplored areas in Tibet. The route for some distance between 80° 40' and Tengri Nor was about 150 miles to the north of that of the Pundit Nain Singh in 1874. Here Captain Bower passed a chain of salt lakes, one of which, Hor-Ba-Tu, is described as probably the highest lake in the world, 17,930 feet. For many weeks the route lay over uplands exceeding 15,000 feet. At Tengri Nor, Captain Bower and his companion, like Prince Henri D'Orleans and M. Bonvalot, were met by Tibetan officials, and ordered to return; but this they declined to do, and eventually made their way to Western China, apparently following a more northern route than that

of the French travellers from Tsiamde by Ta-tai-en-lu, to Shanghai. It is hoped that full details of this remarkable journey will soon be available.

As usual the Russians have been actively at work in Central Asia. An expedition under Captain Bachevski left Samarkand in June for the purpose of supplementing the work of Captain Grombchevski in the Pamirs and Hindu Kush. M. Katanov was exploring the Tian Shan last summer, travelling by way of Umrutsi and Barkul to Hami.

In Central Asia the French traveller, M. Dutreuil de Rhins, has been travelling in various directions, with his companion, M. Grenard. At the end of 1891 they had returned to Khotan after making an important excursion to Nia, in the course of which they had visited the principal source of the Karia-daria.

A useful piece of exploration was accomplished by Mr. C. E. Biddulph and Captain Vaughan, who in April last year crossed the western portion of the great Persian desert by the Siah Koh mountains and the Daria-i-Namak. They found all the maps quite incorrect as to the position and nature of the area marked as swamp.

In Africa there has been no slackening of exploring activity during the past year. In the early part of the year Mr. E. A. Floyer accomplished a journey from Assuan across the Egyptian desert to the Red Sea, supplementing the journey described in the 'Proceedings' of March 1889. Mr. Floyer mapped his route and made important additions to knowledge, both in the desert and on the site of Berenice and other places on the coast.

Both English and Germans have been active in the Great Lake region. The survey for the railway from Mombassa to the Victoria Nyanza, under Captain MacDonald, has reached some 350 miles from the coast. Captain Lugard, who has been effectively looking after British interests in Uganda, has traversed the region on the north-west of the lake and crossed the country between that and Lake Albert Edward. His reports abound with information on the region, correcting much that is erroneous on our maps as to the relative positions and extent of native states, and in the configuration of the country. The information he has collected as to the industrial capabilities of this region will be of great service, and his route maps will be of high value to the cartographer. Emin Pasha has also been busy; he and his companion, Dr. Stuhlmann, from Bukoba, on the west shore of Lake Victoria, reached Lake Albert Edward and Mount Ruwenzori, and thence proceeded to the Albert Nyanza; but how far north they succeeded in getting, we have, so far, no information. *En route*, they came upon the river Kifu, coming from the south-east, and flowing into Lake Albert Edward. The river is reported to be the most southerly feeder of the Nile; but as yet we know too little of its origin and course to accept this without considerable reservation. Father Schynse, whose death we have to regret, made a journey, in the early part of 1891, from his station at

Bakumbi to the south of the lake, round the south-west corner, and along the west coast, to near the capital of Uganda. He found the bay, discovered by Mr. Stanley, to be shallow, and its waters apparently retiring from the shore. But if we may trust the interesting observations of Mr. Ernest Gedge, this retirement is probably temporary, for the Victoria Nyanza, like the other African lakes, seems to be subject to changes of level, the oscillation extending over a period of years.

In Somaliland the Italians have been doing good work. Signor Robecchi, during the first half of 1891, starting from Magadoxo, through various obstacles succeeded in reaching the Webi Shebeli, and Barri, the most southerly point visited by James and Aylmer in 1885. Signor Robecchi made two attempts to reach Harrar, but could only get to within three or four days' journey of it, being compelled to turn eastwards to Milmil, whence he reached Berbera.

Another Italian, Captain Baudi de Vesme, led an expedition into the interior of Somaliland and to the south-west of the Province of Ogadyn. Leaving Berbera, his route was S.S.W., and to the west of James's route in 1885. By Harrar, across the waterless plains of Milmil, he proceeded to Rer Koshen and Rer Amaden. Proceeding south-west the expedition reached the upper course of the Webbe, its furthest point. Another expedition under Signor E. Ruspoli, with Professor Keller as geologist, left last year to cross the Somali country to Lake Rudolf. Still another expedition, starting from Barrawa, was to make for the Jub River, and follow the stream upwards. Further south, under the auspices of the British East Africa Company, Captain Dundas navigated, as I have already mentioned, the River Tana, finding its course full of obstructions. By a further land journey Mount Kenia was reached, and its slopes ascended for a certain distance.

The expedition under M. Crampel, which was endeavouring to push its way from the Congo to Lake Chad, has met with a disastrous end. It had, by way of the Mobangi, reached El Kuti, on the borders of Bagirmi, when, by the treachery of some Moslem raiders, M. Crampel himself and several of his companions were massacred. The expedition, however, succeeded in adding considerably to our knowledge of the region traversed. The lower course of the Mobangi was more accurately laid down, and some knowledge has been gained of the unknown country to the north. An expedition under M. Dybowski was sent to ascertain the details of the massacre of the Crampel expedition. With a considerable force he was able to reach the scene of the massacre, rescued a Senegalese soldier who had been kept prisoner, and inflicted punishment upon the Mussulman raiders who had caused the death of Crampel and his companions. On the Mobangi itself, Captain Van Gèle has succeeded in forging the last link of the lower river with the Welle, and so solving a problem that long divided the geographical world. Still another attempt to reach Lake Chad, or, at least, the River Shari,

from the south must be referred to. M. Fournéau left the French military station of Wassou, on the Sangha (tributary of the Congo), in March last; but, after proceeding some distance beyond the Masa tributary of the Sangha, he was compelled to turn back, owing to the hostility of the natives.

Lieutenant Mizon, another Frenchman, eager to push on to Lake Chad, had succeeded in making his way up the Benué, when he was compelled to turn south, and is reported to have succeeded in reaching the Sangha, an affluent of the Congo. On the Upper Niger, Captain Monteil has added much to our knowledge of the hydrography and orography of the country, establishing that, although the hypothesis of the Kong Mountains must be rejected, and the water-divide removed farther to the north, it would be a mistake to maintain that such a divide does not exist. He is reported to have reached Lake Chad from Say, on the Niger.

Captain Galiwey, one of Major Claude Macdonald's Vice-Consuls, has not only traced the Benin River to its source, but has succeeded for the first time in navigating the lagoons and fragments of streams that lie between the Benin and Lagos. In the same region of Benin, the Governor of Lagos, Mr. Gilbert T. Carter, has made a journey into the interior, during which, as will be seen from his letter published in the May 'Proceedings,' he traversed new ground, and succeeded in discovering a hitherto unknown range of mountains not far from the coast. I have already spoken of the important contributions, made by Mr. Millson, to our knowledge of the Yoruba country.

To the remarkable discoveries made by Mr. Theodore Bent among the ruins of Zimbabwe I have also already referred. Mr. Bent's companion, Mr. Swan, made a series of careful observations along his route from the Limpopo to Fort Salisbury, and thence to the sea at the mouth of the Pungwé. These observations have seemed to rectify the geography of the region traversed, especially since, after Mr. Swan's return to England, the telegraph has been carried to Fort Salisbury, and the precise position of the place accurately obtained. On the other (the north) side of the Zambesi, Mr. H. H. Johnston, and his companion, Lieutenant Solator, have been at work, but have not as yet had much opportunity for exploration. A few months ago Mr. Joseph Thomson returned to England from his expedition to the Lake Bangweolo region. Unfortunately, his health has been so unsatisfactory that hitherto he has been unable to give us any detailed account of his travels. He is believed to have made important rectifications with reference to the area and configuration of Lake Bangweolo.

In the Zambesi region two French travellers have been at work, M. Decle and M. Foa, though they have not as yet opened up new ground, their observations being mainly confined to the natives. In German South-west Africa, Commandant Von Francois has been busy

in Damaraland and Namaqualand, especially in the region watered by the Okovango river, and the great marshes of the basin of Lake Ngami. In the Cameroons also, much activity has been shown by the Germans in pushing their way into the interior, and in opening up the country.

Mr. Swan, one of the missionaries in Msidi's Kingdom (Katanga) has recently returned to Europe. He accompanied Lieutenant Le Marinel in his journey northwards to the Congo. In this way we have received further details as to the condition of Katanga, and especially a few additions to our knowledge of the southern head-streams and feeders of the Congo. We have no information yet as to Captain Stairs having reached Katanga, which is the destination of the expedition with which he left Zanzibar, almost a year ago. According to our latest information he has reached the Luapula without mishap.

Turning to America we find that last summer two parties of explorers under Mr. H. G. Bryant and Professor Lee, were in Labrador. They both succeeded in visiting the falls on the Grand River, which Mr. R. F. Holme failed to reach in 1887. These falls were found to have a perpendicular fall of water of 316 feet, and a width of 200 feet.

An occurrence of some interest to physical geography took place in the Colorado desert of California during the year, the Colorado river having overflowed, and formed what is called a new lake, though really it appears to have been the re-formation of an old lake.

In Alaska, further exploration of the great glacial region which surrounds Mount St. Elias has been made by American expeditions. It was found that the snow-line occurs at an elevation of about 2000 feet above sea-level, and from the vast snow-fields that lie above that level, hundreds of glaciers of the Alpine type descend.

An important addition to our knowledge of the High Andes of Ecuador, and a valuable supplement to the observations made by Mr. Whymper, was given to the Berlin Geographical Society in December, by Dr. Wolf, late Geologist to the Government of Ecuador. Dr. Wolf has shown that the whole of the Ecuadorian Andes must be placed considerably more to the east than in Humboldt's and the more recent maps, thus confirming the observations of Mr. Whymper as to the unsatisfactory character of the cartography of Ecuador.

In the summer of 1891 Dr. E. von Dygalski made an expedition to Greenland for the purpose of investigating the conditions of movement of the ice-masses of that region, and their main physical features. From Jacobshavn various excursions were made to glaciers and fjords, and preliminary arrangements made for an expedition which it is intended should last a whole year, and which left Europe in the beginning of May.

The remarkable table-shaped mountain, Roraima, in British Guiana, was ascended in November last by Mr. E. Cremer and Mr. Seyler. The

two travellers spent the night on the mountain, and made a more complete exploration of its broad summit than had been done before. They saw gigantic and marvellously shaped rocks; many new species of orchids and other plants were found; but the top was almost destitute of animal life.

At the end of April Mr. A. E. Pratt, who has done good work on the border of China and Tibet, left England for the purpose of crossing South America, through the basin of the Amazon. Mr. Pratt is accompanied by a trained observer, Mr. Teed, and is provided with instruments by the Society. He expects to be absent between two and three years, and no doubt will bring back valuable geographical results.

The great Australian Expedition, sent out by Sir Thomas Elder, to fill up some of the extensive blanks in the western half of the Southern Continent, has unfortunately collapsed. Still it succeeded in traversing from north to south the first or most southerly of the three great blanks it was commissioned to explore. This is the wide interior space lying between the track of Forrest in 1874, and that of Giles in 1875. In sore straits for water the party had to make for the seaboard of Western Australia, but thanks to good management the health of the party had not suffered. Though almost waterless, the country is more or less clothed with bushes and trees, and for many miles there is a gum-tree forest which extends into South Australia.

In New Guinea Sir William Macgregor has been as active as ever. Some of his latest expeditions have been to the Islands of the D'Entrecasteaux and Trobriand Group, on the physical geography and the inhabitants of which he has collected most valuable information.

During the year there has been much talk of a joint Swedish-Australian expedition to the Antarctic, but the scheme has fallen through. Several whaling expeditions are now preparing to set out to this little known region, and from them we may obtain some geographical results. Meantime, Dr. Nansen has been pushing forward his preparations for his great expedition across the North Polar area.

Russian Government vessels have during the past year continued their investigations into the physical and biological conditions of the Black Sea; while Austrian vessels have been doing a similar work for the Eastern Mediterranean. The reports on the life, the salinity, the density, temperature, and depths of the former afford important data for working out the history of this interesting sea; while the researches in the Mediterranean have resulted in a much more precise knowledge of the configuration of its bed than we possessed before. In the Atlantic, Dr. O. Krummel has endeavoured to correct previously existing notions as to the great area known as the Sargasso Sea. He has given us more precise ideas as to its extent, shape, and origin, than those which have been generally adopted from Humboldt.

Further light has been thrown on the oceanic currents and tempera-

tures of the Pacific by Dr. Gerhard Schott. He finds that the great oceanic current, the Kuro Shiwo, is not so extensive as hitherto supposed. Under the thirty-eighth parallel the Kuro Shiwo strikes the Oga Shiwo, i.e. the cold Kurile current from the north. In this and other respects Dr. Schott finds striking analogies between the North Pacific and the North Atlantic.

ADMIRALTY SURVEYS.

I am indebted to the Hydrographer, Captain W. J. L. Wharton, R.N., F.R.S., for the following summary of the year's work in this important part of the Government service:—

Admiralty Surveys.—Under the orders of the Lords Commissioners of the Admiralty there have been employed in hydrographical surveys in various parts of the world, eight steamships of war and two hired small steam vessels, their crews consisting of 77 officers and 664 men.

These surveying vessels have been actively engaged in the following localities:—The shores of the United Kingdom, Nova Scotia, Newfoundland, Labrador (Belle Isle Strait), Red Sea, Seychelles, Africa East Coast, China, Borneo, Singapore, Australia, and New Hebrides.

In accordance with annual custom a full report on the work accomplished by each surveying vessel has been prepared for presentation to Parliament, of which the following is a brief summary:—

On the shores of the United Kingdom a re-examination of the Shingles bank, Needles channel, was made, to ascertain the alterations that had taken place since 1881, the bank having extended south and westward. The entrance of Poole harbour was resounded, and fair progress made in the resurvey of Exmouth.

In the estuary of the Thames the Duke of Edinburgh channel was resounded, and an examination made of the Tongue knoll and East end of Margate sand. This examination showed that both the Tongue knoll and Margate sand had extended eastward since last surveyed, necessitating a rearrangement of the buoyage and an alteration in the red arc exhibited from the North Foreland lighthouse.

A large scale plan was executed of that portion of the River Tyne from Howdon, seaward to three-quarters of a mile eastward of the entrance. The breakwaters here are approaching completion, and these, with other harbour works undertaken of late years by the Tyne Improvement Commission, show the success that has been attained as regards the depth over the bar of the River Tyne; for whereas there used to be only 6 feet of water, there is now 30 feet at low tide.

The River Tees was resurveyed seaward from Middlesborough, and the survey embraced that part of Tees bay between Seaton on the north, and Marske on the south. This entrance has also been greatly improved by the artificial works.

New surveys were completed of Oban with its near approaches, Lamlash harbour and Campbellton Loch.

A close survey of Skerries channel (near Holyhead) and also of the North coast of Anglesea from Carmel head eastward to Llanllyfarch head were made. This important locality in the fairway to Liverpool is studded with dangers, and the minute examination of the whole ground resulted in finding several shoal heads of $4\frac{1}{2}$ fathoms in the Skerries channel; besides a new isolated danger $3\frac{1}{2}$ miles eastward of the Skerries, and $1\frac{1}{2}$ miles from the land, with only 20 feet of water over it at low water springs, on which it seems somewhat extraordinary that no vessel has struck. This danger was promptly buoyed by the Trinity House.

In the Southern portion of Cardigan bay a resurvey was made from Allt Wen near Aberystwyth to New Quay, in continuation of work done in this bay during last and preceding years.

In the interests of modern traffic to guide vessels in foggy weather, an examination of the area in the approach to the Northern shores of Ireland comprised between latitudes $55^{\circ} 5' N.$ and $55^{\circ} 42' N.$ and longitudes 7° and $9^{\circ} 55' W.$ was commenced, but owing to the unpropitious weather experienced in this exposed locality delaying sounding operations, there is still a good deal to be done before the above area is completed.

On Foreign and Colonial Shores.—In Nova Scotia, a commencement was made in the survey of the outer portion of Halifax harbour; and on the south coast of Newfoundland the shore from Rose Blanche point, westward to the eastern passage into Dead Island harbour was charted.

In Belle Isle Strait, a survey of Chateau bay, on the coast of Labrador, embracing Temple bay, Pitta, Antelope and Henley harbours, as well as Bad bay, was executed; and a plan of Bradore bay and Harbour made.

In the southern part of the Red Sea, the central area from Perim to Mohabbakah islands, thence northward (westward of Hanish islands) to the parallel of $14^{\circ} 27'$ north latitude was well sounded over, with a view of ascertaining whether the projected route for steam vessels passing west of Hanish islands is safe navigation.

In Seychelles, preliminary lines of soundings were obtained over the rim of Seychelles bank from Dennis island to the southward and westward for 150 miles; the soundings confirming the supposition that there is a nearly continuous rim of more or less shallow water extending along the whole of the western part of this great bank, probably the largest submerged atoll in the world. Plans of Dennis and Bird islands were respectively made, and the whole Seychelles group connected by triangulation.

On the east coast of Africa, the survey of the shore line (under British protection), from Lamu southward to Ras Goman, was well in hand at the end of 1891.

In China, part of the eastern approach to Hong Kong in the vicinity of Lyemun pass was resurveyed; and in the China Sea, when examining Vereker bank, another bank three miles from it was discovered in latitude $20^{\circ} 58' N.$, longitude $115^{\circ} 55' E.$

On the eastern coast of British Borneo, the western and southern shores of Darvel bay were surveyed with its offlying islands and reefs. The south limit of this survey was extended westward, and included the Ligitan group to five miles west of Friedrich haven; whilst the east limit embraced the islands of St. Amil, Pulo Puan, and Pulo Gaya. A detailed plan of Silam harbour and its approaches was also made. A sketch survey was likewise executed of the reefs and islets lying between Pulo Gaya and Sibutu in which is situated Alice channel.

The boundary between British territory and Netherlands possessions, commencing on the parallel of $4^{\circ} 10' N.$ latitude, was determined in conjunction with officers of H.M. Netherlands Navy, and beacons erected to mark the site.

At Singapore a detailed survey on a large scale was made of New harbour and its approaches.

In Australia, on the shores of Queensland, Cook Harbour was surveyed in detail, and in continuation of the work executed in 1890, that part of the inner route southward from Adolphus channel (east of Cape York) to Orfordness was charted. The localities of seven reported isolated dangers to navigation, all near the track of vessels, in various parts of Queensland waters, were searched, but only two of these were found.

Off the north-west coast of Australia the survey of the maze of reefs, banks, and channels north of Capes Voltaire and Bougainville was continued for five months; but the general result of two seasons' work in this locality as regards the prospect of shortening the route between ports and insuring safety is somewhat disappointing; as these waters prove so intricate that there are many reasons against hazarding a large vessel through them without beacons, buoys, or lights, and it seems probable that the quickest and safest passages will be by making the long detour to round the Holothuria banks. A further and more detailed examination was made of the area of magnetic disturbance situated two miles from Bezout island and mentioned in my last year's report on Admiralty surveys with the following result. Within the limits defined of an area of four miles long, north-east and south-west, by two miles broad, with a depth of water of eight to nine fathoms at low water spring tides, the compass is disturbed from 1° at the outer limits to as much as 56° near the focus of the disturbing force. Over this focus the dip needle showed $81^{\circ} 10' S.$, the north seeking end being thus repelled upwards 31° . The greatest range in deflection of the ship's compass was 86° , viz., 56° to the east and 30° to the west.

In the New Hebrides a survey was made of the islands between

Efate and Api, which also included the south coast of Api; and although no new dangers were found, the incorrect positions of these islands as shown on existing charts from old sketch surveys, proved the necessity of the survey in the interest of navigation. The eastern shores of Mallicolo Island from the south-east point to the northern entrance of Port Stanley was also charted, part of which was absolutely new to the charts. A separate plan was executed of Port Sandwich, an excellent harbour on the east coast of Mallicolo, where a valuable series of day and night tidal observations extending over a period of three months were taken.

During the year, the Hydrographic Department has published 80 new charts, improved 18 charts by the addition of 27 new plans, and made 4,038 corrections to the chart plates.

Naval Surveying Officers have also been employed with the sanction of the Admiralty in Canada and India, under the orders of the respective governments; briefly the work that these officers have performed is as under:—

In Canada on the eastern shores of Georgian bay, Lake Huron, the chart comprised between Limestone Islands and Mouse Deer point, including the various intricate channels leading to Parry sound, which was begun in 1890, was completed. This section of coast, now completed, is the most broken up of the whole of the east side of Georgian bay, there being within it upwards of 4000 islands and dry rocks. On the shores of British Columbia, Burrard inlet was resurveyed, and a separate plan executed of Vancouver harbour, the terminal port of the Canadian Pacific line.

In India, on the east coast of Hindustan, a new chart was completed from Bimlipatam in latitude $17^{\circ} 53'$ N. southward to Warreo at the mouth of the central discharge of the Godavari river, in latitude $16^{\circ} 25'$ N. On the west coast of Hindustan, large scale plans were executed respectively of Deogarh harbour, Verawal and Jafarabad; the coast near Jafarabad from Murex bluff to Shialbet was also surveyed.

A commencement was made in the resurvey of the Lakadive group of islands, owing to many being reported to be erroneously placed on the chart to the extent of from three to six miles. The positions of Kiltan, Cardamum, Tree (Bitra reef) Calputi, and Piti Sand islands were satisfactorily determined as well as the Cherbaniani and Byramgore reefs. Many soundings were also obtained amongst these several islands.

The position of Minikoi island was also redetermined, and a small plan made of the island.

OBITUARY OF THE YEAR.

Our losses by death this year have been terribly numerous—one hundred and fourteen against an average of eighty. Among these have been a large number of

distinguished men, some of them so closely connected with us that the first duty I have had to perform at more than one of our Evening Meetings has been to announce their disappearance from our ranks. We have had to deplore the death of Mr. BATES, our admirable Assistant Secretary, illustrious as a traveller, indefatigable as a man of business, the friend and adviser of all who had relations with this Society during more than a quarter of a century. We have lost the pleasant presence of Colonel GRANT, the gallant companion of Speke, whose appearance a few months ago was very far indeed from presaging so early a termination to his career. The death of Lord ARTHUR RUSSELL, also premature, has robbed not only English but European Society of one of its most cherished ornaments, and sensibly diminished the amount of wisdom in a world which has none too much of it. Mr. JOHN MURRAY, so long the head of the great dynasty in Albemarle Street, passed away full of years and honours, after doing perhaps more for the higher education of England in our times than any other single man, by the publication of his invaluable Handbooks. I may mention an interesting fact which was told me by Mr. Murray himself, that namely, the idea of calling them into existence was suggested to him by a little manuscript guide to Holland, which was lent him when he first went abroad by Dr. Somerville, best known as the husband of his much more famous wife. In addition to those whom I have mentioned, we have lost Sir OLIVER ST. JOHN, an Indian political officer, naturalist, and scientific traveller. We have lost Mr. MAJOR, who was for so many years most closely associated with our labours; we have lost Professor MOSELEY, who will long be remembered in connection with the 'Challenger' Expedition; and Captain BLAKISTON, of Chinese fame; we have lost Sir ROBERT SANDEMAN, who recalled, to those who could remember them, that now long-vanished generation of Indian soldiers and diplomatists who out-manoeuvred the Mahratta Brahmins in Council, and broke their lories in the field. Lately this melancholy list has been swollen by the name of Sir LEWIS PELL, another famous Indian officer of a different and later type than Sir Robert Sandeman, although, I think, an older man, of a type half way between the Indian "political" and the European statesman. Many others have been taken from our ranks by death, who, though they may not have been known as geographers or travellers, were distinguished in other walks in life. The complete list is as follows:—

J. A. ALSOP; Admiral R. D. ALDRICH; the Earl of ALBEMARLE; LOUIS ABELSON; AUGUSTUS BAKER; Dr. B. BORNN; Capt. THOS. WRIGHT BLAKISTON, R.A.; Ex-Emperor of BRAZIL, DOM PEDRO II.; Sir ARTHUR BLYTH; Sir VICTOR BROOKS, Bart.; Hon. C. P. BROWN; Sir WILLIAM BOWMAN, Bart., F.R.S.; A. J. BURNES; W. J. BARBOUR; F. CALVERT; Lord CHEYLEMORE; H.E. Senhor João DE ANDRADE, Hon. Cortes. Member; ROBERT F. COOKE, Captain W. CHIMMO; Duke of CLEVELAND; THOS. BEATH CHRISTIE; Hy. AUG. COWPER; JOHN FRAS. CHAMPION; H.I.H. the Grand Duke CONSTANTINE, Honorary Member; Sir GEORGE CAMPBELL, K.C.S.I., &c.; Sir JOHN COOKE, G.C.M.G.; Hon. PAYAN DAWNAY; General Sir R. P. DOUGLAS; FREDERICK DREW; Sir J. F. DAVIS, Bart., F.R.S., &c.; Duke of DEVONSHIRE; Viscount DILLON; Capt. HUGH DAVIS, R.N.; M. HENRI DUVEYNIER, Hon. Cortes. Member; E. PRICHARD EVANS; CHARLES ELMS; E. G. FOX; Sir R. N. FOWLER; C. W. FRANKS; Rev. JOHN GRIFFITHS; ANTOINE GABRIELLI; U. G. DOYLE GLANVILLE; Col. JAMES A. GRANT, C.B., F.R.S., &c.; J. GRIERSON; H. C. GODWIN; C. MITCHELL GRANT; H. J. GOTTO; JOSEPH GOOLDIN; Sir JOHN HAWKSHAW; GEORGE HOPCRAFT; Capt. HENRY HARRIS, M.C.S.; WM. CHAS. HENRY, F.R.S.; Commander R. F. HOSKYN, R.N.; R. S. HOLFORD; DOUGLAS HENTY; JOSHUA HAWKINS; Sir A. A. HOOD, Bart.; CHARLES HARVEY; H. I. JENKINSON; Dr. JUNKER, Hon. Cortes. Member; Lieut.-Gen. EDWARD KATE, C.B., R.A.; HAYES

KYD; Sir J. R. LONGDEN; Lieut.-Gen. R. G. A. LEARD; WILLIAM LORT; P. C. LOVETT; W. F. LAXTON; THOMAS KERR LYNCH; FREDK. LEHMANN; Col. G. LONGLEY; R. H. MAJOR; J. H. MURCHISON; Prof. H. N. MOSELEY; W. C. MIDWINTER; Sir T. W. C. MURDOCK; J. W. MIKES; Maj.-Gen. G. McANDREW; JOHN MURRAY; H. J. NICHOLS; A. R. NICOLS; Count STAS OSTROGÖG; Sir Geo. R. OSBORN; Right Rev. CHAS. PERRY, D.D.; W. C. PICKERSOILL; Major F. G. S. PARKER; Gen. Sir LEWIS PHELPS, K.C.B., &c.; A. O. RUTSON; DAVID ROSS; J. L. RIGDEN; Lord ARTHUR RUSSELL; J. BRINSLEY RICHARDS; J. R. RODD; Right Hon. W. H. SMITH; J. O. SMETHAM; W. R. SANDBACH; GEORGE SIRLEY; Col. J. F. D. CRICHTON-STUART; JAMES S. STUTCLIFFE; Sir OLIVER BEAUCHAMP COVENTRY ST. JOHN, B.E., K.C.S.I.; G. FREDAY SMITH; JAMES SEARIGHT; J. B. SPENCE; J. P. STOCKER; Lieut. W. H. SIMPSON; General CHARLES SAWTER; Col. Sir ROBERT SANDEMAN, K.C.S.I.; WILLIAM SCOTT; Rev. F. TRESTRAIL; GEORGE TOMLINS; Lieut.-Gen. J. WILSON; J. H. B. WARNER; J. R. WEHNER; ARTHUR WELLS; Right Hon. Sir W. A. WHITE, G.C.M.G., G.C.S.I.

The Indian Surveys, 1890-91.

From the Annual Report on the Operations of the Survey of India Department for 1890-91, it is evident that the Surveyor-General's Department has displayed its usual activity during the year, not only within the periphery of the British frontier, but also in the regions beyond. To the former class of work belong the field operations carried on by twenty-three parties and seven small detachments, one of which was employed on the extension of principal triangulation for Upper Burma, along the meridian of $96^{\circ} 30'$; while on the Western frontier the observations required to complete the series of secondary triangles from the Great Indus Series to the Kwaja Amran range beyond Quetta were executed, and points laid down towards the newly-annexed district of Zhob. Four topographical parties and one detachment were engaged in Bombay, Burma, the tin-producing tracts of Mergui, Baluchistan, the Himalayas, and the Punjab; while seven parties and one detachment were carrying out cadastral surveys in Bengal, Burma, the North-West Provinces, and Assam; and two parties were employed on special traverse operations in the Central Provinces and Lower Burma.

In respect of geographical surveys and reconnaissances, the very large area of comparatively unknown country surveyed during 1889-90, has been exceeded during 1890-91, the total out-turn being over 100,000 square miles. Of this total 41,844 square miles have been mapped in Burma, and 59,004 in Baluchistan and Persia.

Two field parties have carried on the preliminary survey of Upper Burma on the quarter-inch scale, and have furnished surveyors to accompany various military and exploring expeditions. The out-turn of the more regular survey work, which is being carried out by districts, amounts to 18,494 square miles. Captain Longe and Lieutenant Gordon accompanied the military force operating north and west of Mogaung; and the latter officer subsequently joined the expedition to the Jade Mines. A rough reconnaissance of 2000 square miles of the Haungshe country (whither an expeditionary column has since been despatched) was carried out, and an area of 1300 square miles was sketched in the Kachin Hills, east of Bhamo. Major Hobday's interesting exploration of the twin head-streams of the Irrawaddy, while accompanying Lieutenant Elliott's political tour, with its valuable maps, has

already appeared in our 'Proceedings' for March last. Further south also, two columns operated on the eastern border of the northern Shan States, and towards Kyaington-Chiengmai, and secured creditable out-turns of work.

A survey detachment, consisting of Colonel Holdich, Captain Mackenzie, and two native sub-surveyors, accompanied the Zhob Valley field force, the first-named being attached to the column under the late Sir R. Sandeman, while Captain Mackenzie and the two sub-surveyors joined Sir G. White's column. About 5350 square miles was reconnoitred on the half-inch and quarter-inch scales, while the triangulation was extended north of the Kundar valley, all this being over country previously unexplored. The military expeditions on the North-west frontier were each accompanied by small survey detachments. Captain Wahab, R.E., succeeded in mapping 95 square miles on the one-inch scale, of the country on the Miranzai border, during the first expedition. On the close of the operations he was detailed to join the Hazara Field Force, where he was enabled to survey and sketch a considerable area. Early in April, Captain Mackenzie, R.E., with sub-surveyor Hussein-Baksh, proceeded to join the second Miranzai force, and extended the work done by Captain Wahab. The Samana range, where the gathering of the hostile tribes took place, is a limestone chain with occasional fairly level rounded summits, and numerous spurs running north and south and separated by deep and precipitous valleys. Both main range and spurs are crowned by villages with solid, well-built towers perched on commanding points. Several of these, however, have had to be blown up by our troops, as a warning to the rebels. Every available spot on the hillsides has been worked up with much labour into terraced fields, and the amount of cultivation is considerable, the water supply being derived mainly from the rainfall which is collected in tanks on the hillsides and crests of the range.

A re-survey of portions of the Zhob valley and some additions in the neighbourhood of Yusuf Kach were completed by Sub-surveyor Jaffar Ali, in all nearly 1400 square miles being surveyed on the half-inch and quarter-inch scales. In December 1890, Mr. Tate accompanied Sir R. Sandeman on a tour through Southern Baluchistan, and completed about 108 miles of route survey between Los Bela and Panjgur, with 1500 square miles of reconnaissance on either side of the road. At Sir R. Sandeman's request the sub-surveyor, Ahmed Ali, was deputed to meet him at Panjgur for survey purposes. In six months Ahmed Ali returned to Quetta with a geographical survey based on triangulation of 22,000 square miles of country on the Perso-Baluch frontier, of which very meagre information previously existed.

A Recent Journey to the Head Waters of the Ucayali, Central Peru.

By ALEXANDER ROSS, Esq.

(Read at the Evening Meeting, March 28th, 1892.)

Map, p. 432.

THE journeyings of which I propose to give some account were undertaken by desire of the Peruvian Corporation, of London, who invited us, as experts in tropical agriculture, to explore certain districts in the central territory of Peru, with the view of selecting and inspecting land which the Corporation has the right of acquiring; and to report generally

upon their suitability, climatic conditions, and other matters affecting the industrial geography of that part of the country. I was accompanied by Mr. Arthur Sinclair, who, like myself, had spent many years planting in Ceylon; and also, for research in economic botany, by Mr. P. D. G. Clark, Assistant at the Royal Botanic Gardens, Peradeniya, near Kandy, Ceylon. Our travels during the five months we were in the country were confined to the central portions of the interior, and extended from the terminus of the Central Railway at Chicla, in the direction of the Amazon basin as far as the rapids of the Rio Perené, on the coast; the towns of Cerro de Pasco and Huanuco—the latter on the Rio Huallaga—on the north; to Jauja, Huancayo, Comas, and Andamarca on the south and south-east; also, to a limited extent, on the western coast north of Callao. The area visited is perhaps not of great extent, having regard to the immense territory we had set out to explore, and has been visited by several competent travellers in the past, while in quite recent years the Peruvians themselves have turned their attention towards opening up the interior of their interesting country.

The Andes system consists of three ranges—the maritime or western, central, and eastern cordilleras or chains. The eastern is called the Andes. The *Montaña* means the forest region east of the Andes. The *Montaña* comprises the country between the Sierra and the Brazilian boundary. It consists mostly of trackless and unexplored forest, but sparsely inhabited by the Indian tribes. In it are all the navigable rivers. Its wealth of vegetation is great, and the forests contain much valuable timber, as well as economic products of all sorts—rubber, chinchona, cacao, coca, ivory-nut, and many others. The climate of the *Montaña* varies with situation and altitude. Above 2500 or 3000 feet, the air is soft, to cool and bracing. Below, it is more tropical, the temperature running up to 85° on the river banks, in the middle of the day. The outline of this tract of country is undulating, and in parts high and precipitous. There are innumerable rich and sheltered valleys, suited at various altitudes for every product of the tropics, as well as many from temperate climes. The vegetation met with on our routes defines very closely and accurately the altitudes as well as dryness or otherwise of the various localities through which we passed. Orchids, mosses, ferns, and lichens abound in great variety. The rubber-tree is generally found lower down in the Amazon basin than the point reached by us, but from my experience of its cultivation in Ceylon, and the numbers of allied species we met with, I am satisfied as to the suitability of the lands visited for its growth. Chinchona abounds in the forests, and we found it around the coffee fields, the owner of which, ignorant of its species and value, had cleared and burnt, fifteen years before, what, had he known its worth, might then have made his fortune! This valuable medicinal chinchona plant was first introduced to the Eastern world by Mr. Clements Markham, with the result, so quickly did it

become acclimatised, so easily was it cultivated that, in Ceylon, planters were enabled by sale of its bark, to tide over the transition period between the decadence of coffee—owing to the attack of a virulent fungus, *Hemileia vastatrix*—and the introduction of tea which has wrought such marvels in the history of that island. It is due also to the introduction of chinchona to the East, and I may say the enthusiasm with which its cultivation was entered upon, chiefly in Ceylon, that the cost of quinine has been reduced from 12s. (in Ceylon many years ago I have paid 30s.) to about 10d. per ounce at the present time. This result of Mr. Markham's search for chinchona in the Andean forests of Ecuador and Peru must have well repaid the very great difficulties and disappointments he experienced in its collection, and conveyance to India.

On the 7th July, 1891, after the completion of preparations for our journey to the interior, we set out from Lima by the Central Railway of Peru. This route is well known and need not be again described. The bridle-road crosses the summit at 16,200 feet. Close to this is the Galera tunnel, 1270 yards long, the highest in the world, piercing the range at 15,700 feet above the sea. The eastern watershed begins from the summit before mentioned, and a gradual descent is made upon Oroya, situated at 12,250 feet altitude, on the banks of the river of that name. Oroya, to which the railway will be completed in a few months hence, is distant from Chicha 50 miles. It is a mere village of a few huts, but destined to become an important place, as the point of junction for several feeding lines of projected railway. The railways to Cerro de Pasco, and to Tarma and the Perené, will run north towards Cacas; and to Jauja, Huancayo, &c., south-eastwards. From the neighbourhood of Cacas the lines for Tarma and the Perené will run south-east to Acobamba, where they will diverge, one south, the other eastward. Our first explorations were directed to the lands among which some of the affluents of the Amazon take their rise. We therefore made for the convent of San Luis de Shuaro, via Tarma and Chanchamayo—an outlying district, the scene of coffee and sugar planting. The road from Oroya to Tarma ascends rapidly at first, 4000 feet being climbed in a few miles, until an altitude of over 16,000 feet is reached. It then descends by gradients of great steepness, and by a track of exceeding roughness into a long and narrow valley, in which there is the merest thread of cultivation. This widens lower down, till again we are among the terraced, cultivated hill sides, and rich flat fields of the populous wayside villages of the Peruvian Indian highlanders. Tarma, 18 miles from Oroya, is situated, at 9800 feet altitude, in a basin among towering hills, which are everywhere terraced, and cultivated. It seems to want only the telegraph, the railway, and improved postal communication, to become one of the largest and most thriving towns in Peru. It possesses a dry, bracing,

and salubrious climate, in which sufferers from pulmonary complaints derive marked benefit.

Having rested several days at Tarma, we set out for the *Montaña* by a wide but somewhat rough road, past the interesting town of Acobamba. Of vegetation—excepting cacti, which seem to be cultivated near the road, for their fruit—there is none, till beyond Acobamba, where the lower slopes are again terraced and grain is grown. Presently we reached the counterpart of the grand and rocky country on the western slope, near San Mateo. The trace, where it had not been renewed, led along the face of almost bare precipitous slopes, overhanging the Chanchamayo river. But this awkward road will soon be a thing of the past. Instead of it a fine new one is being speedily constructed, which will undoubtedly lead to railway extension destined to connect the navigable waters of the Amazon with the Pacific at Callao. Emerging through fields of sugar-cane and tangled clumps of brushwood we reached the Chanchamayo Valley. The Chanchamayo river, at this point a broad, tumbling, rapid torrent, is crossed by a long wire suspension bridge, of sufficient width for mules to pass, but so shaky as to make the crossing difficult, if not dangerous, to inexperienced passengers. At a similar bridge over the Rio Tulumayo, farther on, at Fort San Ramon, we had an accident, which injured my photographic apparatus. This accounts for the want of better photographs to illustrate this paper.

La Merced, situated in $11^{\circ} 6' 63''$ S. lat. and $75^{\circ} 17' 36''$ W. long., at 2400 feet altitude, and 198 miles by road and rail from Lima, is the centre of an Italian colony, and seemingly a thriving little place. The climate is humid, and during the day very warm; but it is exceedingly healthy. Among the inhabitants are Chinese, Italians, and Peruvians, engaged chiefly in trade and agriculture. In the coffee-gardens there are French families, whom the surroundings and climate evidently suit. This district was, twenty years ago, the scene of a busy planting industry, which has since greatly fallen off, through expensive transport and scarcity of labour, due chiefly to imperfect communications with the towns and markets of the hills and coast. It is destined now, however, shortly to emerge from its present state of semi-neglect, for through it probably will run the railway from the Pacific to the Atlantic, opening up to civilisation what is now a waste of trackless forest. From the summit of the mountains the country slopes by a series of undulations, relieved by high ranges and wide valleys, trending generally north and south.

The road follows the left bank of the river—which might be made navigable for balsas or flat-bottomed boats up near to La Merced—thence crossing the rapid mountain streams Rios Blanco and Colorado, as far as Beun Pasteur, near Port Werthemann. At Beun Pasteur, the residence of a thriving Chinaman, we had lunch, cooked by his Indian

wife, who was surrounded by a numerous family of pretty pale-faced children. The head of the house had been about twenty years in Peru, and had embraced the Roman Catholic religion. He stated, shaking his head laughingly in response to my enquiry, that he never had a wish to nor ever would return to his native land. Soon after we met, still on our right, the Paucartambo river, here rushing on, a boiling whirling torrent, there a calm still stream, flowing on its way to meet the Chanchamayo we had left behind. The two streams then take the name of Perené, a fine broad river, whose course we were to follow while visiting the adjacent lands. Before dark we reached the convent of San Louis de Shuaro, where we had been expected, and were now made welcome by the superior and his Franciscan brothers. Heavy rain detained us here three days, but at last, accompanied by Padre Sala, chief of the mission, and Padre Carlos, from the Ucayali, we set out upon our wanderings in the wilds, having first despatched our cargo mules. About 4 p.m. next day we came in full view of the lovely Perené—a bird's-eye view, as it were, from an altitude of 5300 feet, looking down almost perpendicularly upon the lonely domicile of an Indian chief. At last, down the steep face of the mountain, again benighted, we found our way, at 7 p.m., to the residence of the chief. On nearing it we were met and welcomed by a most extraordinary looking creature of an Indian—the doctor we afterwards found he was called—and one or two others, rude looking and unkempt, with whom at their own suggestion we shook hands. We passed an uncomfortable night.

To descend the river, balsas or rafts were necessary, and as there were only one or two small ones available, others had to be made, which took some days. We made meanwhile excursions into the forest, so discovering its suitability for the object of our quest, i.e. tropical agriculture. We note the great and varied beauty of its vegetation, and the matchless richness of its soil. During our stay we were visited frequently by Campas Indians of the lower and Pangoa districts along the river, who, leaving their balsas, or rafts, at this place, cross the hills to, and return from, the Cerro de la Sal with their periodical supply of salt. Raimondi, the celebrated traveller, to whom Peru owes so much in the way of geographical and geological research, says: "The Campas form a nation numerous, brave and warlike. They are distinguished from the Piroes by their language, as by their not having the custom to paint their teeth, which are beautiful and white. They wear a tunic inclining to yellow or golden. The tunic of the Campas reaches down to the ankle." He continues: "The Campas who inhabit the mountains of Chanchamayo are very hostile, and no friendly relations can be entered into with them."

The features of the country, as seen from the Metraró pajonal, are steep near the river bank, rising abruptly, with occasional flats, from

200 to 500 feet, in densely-wooded slopes. Thence up to 4000 feet, more undulating, till at and over 6000 feet, where precipices jut out; and beyond, in the distance inland, peaks and ranges of the Cordillera shut in the view. The country north and east is one long stretch of easy sloping undulations, broken here and there by crests and ridges, clothed with dense unbroken forest. On the left bank of the Perené, beginning from the Rio Eñeno, near the junction with which the residence of Kinchoquiri is situated, the range rises in an easy slope, broken by ravines which are steep and rocky on the river banks till the Uberiqui is reached. From it, eastwards, extends the "Pampa Hermosa"—beautiful plain or tableland—stretching as far as the eye can reach towards the Ucayali. The right bank, which is bounded to the limit of vision by mountains, in the vicinity of the Pangoa is steeper, running right down to the river, though having rich and sheltered valleys. These are drained by the Pitchana, Quimiri, and Ipuji, which find their way to the Perené on its southern side. The basin of the Pitchana is closed in by high and bare looking mountains, through which that stream has cut an outlet; while near the latter both banks of the Perené are more open, flat, and undulating, richly timbered throughout and over a most beautiful country. The prevailing rock along the whole course of this river is decomposed slate, indicating an auriferous country.

The Perené itself is a river of considerable volume, varying in width from 60 to 150 yards at the narrowest parts where the banks are high, to 200 to 300 yards where they are low and receding. In the latter reaches the stream divides into two or more shallow channels, where generally there is a considerable dip, or fall, and in which the speed over the shallow pebbly bottom is seldom under seven knots per hour. Elsewhere, excepting in a few deep still pools, the current is not much under four knots. In depth it varies from a foot or eighteen inches over the shallows referred to, and 2 to 15 feet and upwards near its bank and mid-stream. The streams falling into the Perené on the north are the Eñeno, about 12 miles in a direct line from Port Wertheimann, of no great length nor volume, indicating the close proximity of the watershed above. At its confluence with the main river it is about 20 feet wide and three to four in depth; but above it is wider and much shallower. A short distance below we landed and tasted the water coming in a small stream from underneath a rock, and found it quite salt, indicating, probably, a salt mine not far off.

Next, about five miles, also in a direct line further down, is the Uberiqui, of greater volume, while farther on are two much smaller rivulets which were all but dry. On the south, five miles farther, is the Pitchana, which, draining a wide and deep valley, is larger than either of the others mentioned. At its mouth a sandy delta has accumulated, almost obscuring the stream, which runs into the

Perené with considerable velocity. Still farther eastward, where the banks of the latter recede some distance, is the Quimiri, a small unimportant rivulet, more noted by us because of our having stayed the night at a Chunchos hut a short way from its mouth. Last of all comes the Ipuji, which, draining a more steep transverse range of mountains, delivers a considerable volume of water shortly before the cascades are reached.

A little eastward of the Ipuji a mountain range crosses the valley, and it is in cutting a way through this that the Perené formed the series of cascades. Here is an obstacle to navigation, but from what we saw we should say there is nothing engineering skill cannot overcome. And if further down the difficulties are not immeasurably greater, there exists no reason why simultaneously with the opening of the Chanchamayo-Tarma road a way could not be found of connecting the railway system of the western coast with the waters of the Amazona. It had been part of our arrangement to explore these rapids throughout; but the morning after our arrival we were compelled to relinquish our intention owing to difficulties with Padre Sala and the Indians, which need not be detailed. We arrived at our starting point, the mouth of the Eñeno, on 12th August, our men done up, and we ourselves glad of a rest.

The next journey undertaken was to Huanuco on the Rio Huallaga. To reach it we returned from Tarma to Acobamba, thence turning north-west through a narrow defile, which is highly cultivated, nearly as far as Cacas, the point whence the railway from Oroya to Tarma and the Perené districts should leave the projected line to Cerro de Pasco. The head of the valley approaching Cacas presents some wonderful geological features. A stream which flows along cuts deep into the earth, above which lies a great thickness of conglomerate, then again yellowish sandy clay, which is in turn topped by immense masses of solid rock in bold precipitous outline. Cacas is a little sierra town situated at 12,400 feet altitude upon the border of the Pampa of Junin. The latter is an immense plain in which the towns of Junin, Carhuamayo, Niñacaca, Pasco, and Cerro de Pasco are situated.* At Carhuamayo the road through the mountain passes to Huancabamba, a distance of 24 leagues, thence 9 leagues to Mayro, the highest navigable point from the Pachitea, the latitude of which is $10^{\circ} 55' S.$ and $75^{\circ} 40' W.$ of Greenwich. Cerro de Pasco is a town of 6000 or 8000 inhabitants engaged chiefly in silver mining and trading. It is on the Pampa at an altitude of 14,200 feet, where one of the most extensive and richest silver-mines known has been worked for generations by the Spaniards and Indians. The direction of the plain is from south-east to north-west. Some idea of the mineral wealth of these mines may be formed from the fact that

* At Junin boiling point was $188\frac{1}{3}$; equivalent barometer 18-274. Min. temp. $35^{\circ} F.$, max. 54° .

during the occupation of the Spanish up to 1803 the immense amount of 61,860,320*l.* was realised from their working. And though the industry has greatly fallen off there still is a large quantity of silver produced monthly, which will be very largely augmented when certain measures which are in contemplation effecting the drainage of the mines shall have been completed.* In the vicinity are also veins of coal, almost at the surface and in considerable quantity. The coal here found varies, some being akin to our own Wallsend, burning freely, full of gas, and leaving a minimum of ash. Other sorts there are which burn more slowly, giving off great heat but leaving more ashes. The climate is raw and cold, but not unhealthy. Snow, mists, and rain or sleet are frequent.

Leaving Cerro de Pasco the road leads almost immediately down a wild and narrow gorge beside the tiny rivulet, whose source, a spring, is pointed out just where the descent begins. It is the Huallaga, one of the great affluents of the Amazona. As it descends the stream speedily increases in volume, tearing and tumbling along its rocky bed almost all the way between mountains, whose sides, so high and precipitous are they, barely show the landlips measuring from 100 feet upwards, which have occurred on the river-banks. The ranges on either side trend north and south, are rich in soil and from 12 miles below Cerro de Pasco begin to be cultivated in the usual terraces. The valley widens at Huarriacca, which is placed at 9550 feet altitude, where there is a warm mineral spring, and near it, in the middle of a small field, a hole five or six feet wide at its surface and sloping to about three feet in depth, where we were told birds and reptiles on crossing it fall dead. The reason no one knew. At the spot we found a blackbird and a mouse both dead. There was no indication of gaseous exhalation. I stood in the place, but experienced no ill effects—indeed, we were told it had none upon human beings. The pit was only about 70 yards—across a stream—from the warm mineral springs with which probably it has some connection.

The climate of Huarriacca is pleasant and bracing—dry for half the year, but wet from November to April or May. The slopes become loose and dangerous from land-slips a few miles on. The prevailing rock is decomposing slate, over which the soil is extremely rich. The valley continues narrow and precipitous till near Ambo, 18 miles farther on, at 7400 feet altitude, it opens out and tropical vegetation and crops begin. It was a couple of miles ere reaching this place where we first saw coffee. The whole country is extremely dry, and cultivation is carried on by means of irrigation. The hills above, 2½ miles from Ambo, seem slipping, or partly to have slipped, into the valley beneath in one huge mass. From Ambo northwards the aspect of the country changes. The hills recede somewhat, the valley

* At the Pampa, boiling point 137°; equivalent bar. 17·806; min. temp. 32° F.

widens, fields of sugar-cane, rows of willows, and clumps of the wild pepper-trees, among which the locality of some pretty villages, marked by church spires, adorn the plain.

Returning to Cerro de Pasco by the route we had come, we proceeded to Lima via Incauilca, San Blas, Baños, Casapalca, and Chila, arriving on 24th September. The plain a great part of the way is absolutely flat, of immense extent, fringed on the west by a most peculiar rocky formation of the Andean range, resembling in the distance forest trees, but which as we got nearer (though a good many miles off) seemed huge perpendicular laminated rocks, standing upright in a bed of snow! Towards the east, trending southward, the high and undulating mountain range above Carhuamayo was partly hid in a furious drifting snow-storm. The scene was extremely grand, but our admiration was tempered by the cold, and the effects upon some of our people of the sickness brought on by breathing and exertion in the rarefied air of these great altitudes.

My next journey was directed to the valley in which are situated the towns of Jauja and Huancayo; and to the country to the eastward towards the Rios Ene and Perené. Leaving Lima again for Chila and Oroya, evidences of the approach of the rainy season were met with, in sleet and snow at Chila; and near Galera, where I stayed a night with Mr. Ward, the engineer in charge of the tunnel, the country was white all over with snow. The road taken ascends to and runs along the Puna, which stretches in rocky broken country, or extensive flat and undulating plains, the whole distance till the first Sierra village, Acolla, is reached, and near which are some Inca ruins, the centre of a rich agricultural district. Sheep and cattle are to be seen (but not in large numbers) grazing all along the way. The only habitations are those of a shepherd at Cachicachi, an estancia consisting of a few huts, and at Acolla. Jauja, a town of some importance, situated at 11,800 feet,* possesses one of the finest climates in Peru. Residence in its most salubrious atmosphere is considered an assured cure for pulmonary complaints. Rain falls only between November and April; during the rest of the year there is none. It is situated at the head of a large valley, at the extreme southern end of which, 1000 feet below, is Huancayo, a fine town of no less importance. Along both sides of this magnificent valley, which is densely populated, and extends to about 35 miles in length by from 6 to 10 miles in breadth, are numerous towns and villages, the inhabitants of which are chiefly engaged in agriculture, but who also work at the mines of the Yauli and Cerro de Pasco districts, &c. The hills around bear evidences of the skill and industry of the Incas of the past centuries in the numerous ruins invariably on their crests, and their terraced slopes. Everywhere

* Boiling point $192\frac{1}{2}^{\circ}$, equivalent $19^{\circ}55'$; aneroid $19^{\circ}910$.

the soil is rich chocolate loam, which is readily cut up into ruts and washed away by the rains where these terraces through neglect have been broken down.

The Oroya river debouches upon the plain at Huarripampa, bisecting the valley, and destroying a large extent of country in the vicinity of its course. Huancayo, situated at 10,800 feet altitude, is a town not perhaps so populous as Jauja, but to which more produce is taken for sale at its large weekly market held on Sundays. It is prettily situated, and slightly wooded. Here the broom, growing to about 20 feet, attains its greatest excellence, and lined the roads, at time of my visit, with perfumed avenues of golden-tinted blossoms.

Returning to Ocopa, the chief monastery of the Franciscan friars, I found Padre Sala, my companion on the expedition to the Perené, now in charge as superior. The following morning we set out towards the Rio Pangoa. A steep ascent for over three hours through very rough ground, and many small potato fields, took us to the first summit, at 15,000 feet. We followed the rocky track over extremely rough undulating country, crossing ridges at 14,500 and 15,000 feet, when a rough path begins to zigzag down the face of the ridge among high and rugged precipitous mountains, till the eastern watershed is reached. The descent upon Comas is along the course of a stream which increases in volume as it lengthens towards the town, 24 miles from Ocopa and situated at 10,400 feet altitude—where we were to stay the night. The country all along the route is cold and bleak, with snow-capped ranges seeming, from the summits we had passed, to flank and bar the way. Very stunted grass only is produced along this sterile region, and only a few cattle are seen, and no cultivation, till at about 12,000 feet, small fields of potatoes are here and there encountered. Comas was reached at dark in the company of the curé whom we had overtaken on the road, and to whom we had a letter. The village is prettily situated on a high and narrow saddle jutting out between two rivers, but at an altitude of 800 and 900 feet above their rocky beds. The inhabitants, of whom there are about 1000, follow agricultural pursuits only. They grow potatoes, Indian corn, grain, and alfalfa. Their tools and implements are all of wood. We stayed the night with the curé, by whom we were hospitably entertained. The following day we set out for Andamarca, 36 miles. The country throughout is of the wildest description, the roads excessively steep, and at many points dangerous.

Ascending and descending from 10,500 to 13,000 and 15,000 feet by roads, at times which bore no semblance of a trace, till after a long descent Matapa at 8100 feet is reached, and at Andamarca, at 8300 feet, in the same wild region (of which it is the chief place) we decide to stop. The country about this latter town is wild in the extreme, the ravines are narrow and the hillsides steep and almost bare of any vegetation except grass. Returning to Lima by the same route I arrived there on

9th November, and on 24th sailed for England, by way of Eten, where I had arranged to visit the hacienda of Señor Pardo, son of a former President of Peru.

There is not much of the Sierra visited by us suited to modern systems of tillage. But in the Montaña there are vast areas at suitable altitudes well adapted for settlement by European immigrants. Whilst, in the lower parts of the Amazon basin, in a climate more or less unsuited to white labour, immense tracts await only the introduction of Chinese or the Indian coolie to turn what is now a magnificent forest wilderness into a rich and thriving province. The Central Railway will have been completed to Oroya a few months hence. The Chanchamayo road will be opened soon after. In continuation of these, and to connect them with the navigable waters of the Amazon, the survey of a railway line has been already ordered. The immense influence these communications will have upon the future of Peru and its progress will then soon become apparent. At present, to those who have not seen that country's varied and unlimited mineral resources, its grand forests, its rich soil and splendid rivers, a full realisation of the future of Peru is impossible.

The following discussion ensued after the reading of the paper:—

Señor F. A. PRZER: As Peruvian Consul-General in London, I beg to thank Mr. Ross for his very interesting paper on his recent travels. He mentions that the Peruvians themselves have done a great deal within recent years to acquire a better knowledge of their country. That is true, for the Government within the last few years have given special attention to the exploration of different districts in the interior, and for the purpose of promoting such knowledge they organised the Geographical Society in Lima. This Society, since its inauguration in 1888, has established branches all over the country, in the different cities of Peru; these have been called "Andean Centres or Clubs," and are composed of the principal men in the various Departments. The object is to acquire a thorough geographical and scientific knowledge of the country. Within the last year the Geographical Society has published a Bulletin. It is very interesting to know that only five or six months ago a commission was sent out to report on the new road opened by the Government from S. Louis de Shuaro (mentioned in the paper) to the river Pichis, one of the affluents of the Pachitea, which itself is an affluent of the Ucayali, one of the navigable rivers that water Peru. This road has taken some time and money to make. You have just seen from the photographs that these roads are mere bridle tracks, but we hope in time to come to have good roads and railroads to join the navigable rivers with the populated centres on the coast. This road opens up a great amount of country, and brings Lima within three days of the Pichis, and it is understood that with steam navigation on this river, and with railroads running as far as this navigable point it will be possible to journey from Lima, on the Pacific coast, to Pará, on the Amazon, in about eight days. Thence to Liverpool would be a ten days' trip, thus bringing Lima within twenty days from London, while to-day it is thirty. But the Peruvian Government have not limited themselves to this district, they have also opened or are making other roads. There is one between Paica and Vitoc, a valley which runs near the Chanchamayo, and likewise a very rich valley, especially in

sugar-cane, coffee, chinchona, and all tropical products. From the Huallaga river, a road is being built to unite the great northern city of Moyobamba, with the port of Yurimagosa, and once the road is made between these two places it will bring all northern Peru into direct communication with the Amazon, and thereby with the Atlantic. Further south the Government have also in course of construction a road from the city of Ica to Ayacucho, in the heart of Peru, which will join two great industrial centres—passing through rich gold, silver, and quicksilver districts. The Government are aware that nothing can be done to develop Peru unless the country is thoroughly studied; and as geographical science is undoubtedly the principal lever to commerce, they now give all their attention to this important question, for what would commerce be without geography? This island has been explored and studied so thoroughly that you do not want geography for England, but for these other countries it is all important. When these roads are opened you will have cheaper sugar, cheaper coffee, &c. Mr. Ross in his paper also mentioned Mr. Hammond's name. He was an Italian who settled forty or fifty years ago in Peru, and travelled all over the country from north to south and east to west; he wrote a most complete book on the 'Geographical and Geological Conditions of Peru.' This savant died only last year, leaving a great part of his book published and the other part in manuscript; this has been handed over by the Government to the Lima Geographical Society, and in a very short time this work will be brought before the scientific world. The work deals with the whole region from the Amazon to the coast, and is, indeed, a general scientific treatise on Peru. Mr. Ross mentioned Lake Junin and the region round it. In years gone by when Peru was under the government of the Incas, before the Spanish domination, all the district of Junin, a great part of which is now waste land, was cultivated, and there grew large quantities of grain and cereals, for which to-day we are dependent upon California and Chili; but it is intended to irrigate this land, utilising the water from the lake,—this can be very easily done,—and to grow wheat, which is native to the province, in large quantities, sufficient not only to supply Peru but for exportation. While speaking of this, I may mention that the greater part of the agricultural products of Peru yield not only one crop, but two or three, and even four in some districts. The cotton of the northern department of Piura, the great cotton district, is considered the best in the world. There it rains once in every seven years, and when it does rain the whole land round teems with cotton. The great inundations of last year did a great deal of good to this crop, and the yield this year will be above that of any other year in Peru. Cotton yields there two crops, maize four crops, potatoes three crops, coffee and tobacco two crops, a year, and in addition to the quantity you have the quality. The Peruvian Government having been convinced of the benefit of opening up communication between the Pacific coast and the rivers of the interior, intend to continue these explorations, and by the mails received to-day from Peru, I learn that several Prefects of Departments in the interior, seeing the success of the authorities of Junin in exploring its rivers and territory, intend on their own account to arrange different explorations, so that in a very short time Peru will be able to present to the scientific world a very good account of itself.

Lord DORSETT: I am afraid I cannot add very much to the discussion that has already taken place to-night, except to say that from the experience of some two years and a half in Peru, where I made many friends, and from the observations I was able to make of the country, I can confirm everything that Mr. Ross says in his excellent paper, and everything Señor Alphonso Pezet said. I must say this, that this being the first time I have had the honour of being present at the meeting of the Royal Geographical Society, I am not entirely instructed as to the scope of speech allowed. I understand you confine yourselves to geography,

though occasionally you trench upon commerce. In the very remarkable speech we have had from Señor Pezet he has dealt with certain commercial subjects; but one he has omitted, i. e. sugar. Now, my experience of Peru has been that in spite of countervailing duties on the Continent, and the falling off in the price of sugar of late years, Peru is the country of all others I know which is able to produce sugar cheaper than any other, for this reason, that you do not depend upon seasons. The coast of Peru is practically rainless. Last year, unfortunately, a good deal of rain fell on the coast, and some of us people in the country suffered considerably in consequence; but it is the first time this has happened for thirty years. The consequence is that where the irrigation system exists on the coast, as far as sugar cultivation goes, you are practically independent, as you can put your water on the fields when you like and take it off when you like, and plant in any month of the year, reap in any month in the year, and keep your mill going all the year round. This is one of the great advantages that Peru presents to the sugar cultivator. Now, it was my business when out there to inspect all the great roads of communication which exist, with a view to their prolongation and improvement, and to study, so far as I could, the resources of the country, both for agricultural and mineral purposes. I don't think there exists in the world so great an engineering work as the Oroya Railway, the great central railway of Peru. You saw a picture here to-night of the Galéra Tunnel; well, I have had the honour of walking through that tunnel, 16,800 feet above the level of the sea, when it was only a heading: not a very pleasant operation, but it is one of my most pleasant recollections of Peru. Although the engineering of that line is a remarkable work, still I am not sure that I cannot say that the Southern railway is quite as remarkable. Señor Pezet has talked of the different roads and communications in the country: I am happy to think that these communications are being rapidly developed, and that in the course of a very few years we shall find that these countries, to which Mr. Ross has alluded in his paper, will be within easy communication with the sea, with a prospect of that communication being rendered perfect and more complete and rapid. It is a great piece of good fortune to me that I have been able to come to London in time to be warned by Sir Alfred Dent that this meeting was about to take place, and I am very glad to have taken part in this discussion, because I can say that I have not only a very great interest in the country, but a great deal of affection for a great many of the people who live in it.

MR. CLEMENTS R. MARKHAM: Mr. Ross has given us a very interesting account of his journey across one section of Peru, and if he had crossed at any other part, either in the northern or central divisions, he would have gone over analogous country. He would have crossed the three great chains of the Andes, and descended into the valley of the Amazon. I will make a few remarks regarding the section he traversed. Referring to the coast region of Peru, I must first say something on the subject of the rains to which Lord Donoughmore has alluded. The rains which occurred last year were most unusual, as the climate on the coast is generally dry. The reason for these rains has been assigned to a counter-current observed along the coast. It is, of course, well known that the coolness of the climate is caused by what is known as the Humboldt current, flowing, as it is believed, from the Antarctic regions, and maintaining a temperature of 8° below that of the ocean, in the same parallel further west. Sailors who know the coast well, report that they have often observed a counter-current from the north, but very slight indeed. Last year it was more marked. I hope this will receive the attention of officers who are serving on the coast, and that they will carefully observe any appearance of this counter-current. Leaving the coast I would next refer to that interesting montafia of Chanchamayu. The higher portions of the Peruvian montañas may be described as a region where

pajonales, or grass lands, are interspersed with small woods filling the ravines, like the *sholas*, as we call them, in India. The districts where these *pajonales* occur very closely resemble the Nilgiri Hills. Instead of the rhododendrons of India you have there the very brilliant *lasiandra*, with a mass of purple flowers which lighten up the landscape. The lower part of the country is suitable for coffee and cocoa, opening out, often through the most beautiful ravines, into the vast Amazonian plain beyond. There can be no doubt that coffee can be grown in any quantity there, and other tropical products, but it should always be remembered that in Peru quality goes above quantity. The coffee grown there is the best that was ever tasted; and it is the same with the other natural products. In the forests we have the *chinchona* plant, yielding Peruvian bark, which was introduced into India thirty years ago. Now, 43,000 bales of bark come to the London market annually, and out of that quantity 30,000 bales come from India or Ceylon, about 5000 from Java, and only about 8000 from South America; but the price of Indian bark never rises above a maximum of 9d. a lb., while the South American fetches 1s. 10d. to 2s. Therefore, although the small quantity produced is due partly to the enormous quantity of trees that has been cut down, and partly to the absence of cultivation, still the quality is superior; so that if those who are interested in Peru undertake the cultivation of that plant, they will have the advantage of growing a superior bark as regards quality. It is the same with india-rubber. No rubber in the world is equal to the Para rubber (*Hevea*), and if only a sufficient quantity could be obtained it would drive the stuff from Africa and India out of the market. It grows in the enormous flat plains of the Amazon, including those within Peruvian boundaries, and when its cultivation and collection is undertaken on a large scale, there will again be the advantage of the excellent quality of the product. This valley of the Chanchamayu is only one out of a great many extending up to the Bolivian frontier, all of great richness, and some of them will, I trust, when the railroads are finished, be almost equally accessible. One of them, that of Carabaya, also yields an enormous quantity of gold. I rather doubt whether European immigrants will find the climate suitable to them in the *montañas*. I should like to see them established in the Sierra, for though the Sierra country, represented by the Jauja valley, did not appear to Mr. Ross to great advantage, if he had gone on to Ayacucho he would have been in a country capable of yielding an enormous quantity of wheat. But the people are gone from the land, which used formerly to supply the coast region and even Chile with corn. The beautiful valleys of Andahuaylas, Abancay, and Vilcamayo are equally rich corn countries, and are admirably suited for European immigrants. I should not like to leave this subject without alluding to the interesting history of that chief calling himself Atahualpa, whose tomb has been mentioned by Mr. Ross. He was not the Luca of Peru, but a very much aggrieved Indian, a native of the town of Ayacucho. On account of some great cruelty inflicted upon his family he killed a wealthy Spaniard and fled. He alleged that he was of Inca descent, and called himself Atahualpa. His real name was Juan Santos. He raised up the *Campesinos* Indians, and drove the Spaniards out of the *montaña* in 1740. He then established himself there under the title of Inca, but nobody knows what became of him. The missionaries of Ocopa asserted that he died in the same way as Herod is recorded to have died in the Acts of the Apostles; but I think it much more likely that he died a natural death. The Spaniards did not again appear in these forests for forty to fifty years, and it was due to the missionaries of Ocopa that the country was again opened up. Father Sobreviela, one of the Ocopa fraternity, explored the *montaña* towards the end of the last century, and wrote an elaborate report on the whole country. I have a copy of it, but it has never been printed. The report of Mr.

Werthemann is also extremely interesting, and I regret that it has never been translated into English.

I should like to say just one word on the capacity of the Incas Indians, who inhabit Peru. These are a people to whom the whole world owes a deep debt of gratitude, and they are among the most skilful shepherds and farmers the world has ever seen. The Incas domesticated the alpaca, producing the most silky fleeces that are known. No other people could have given these animals the amount of care, attention, and skill they devoted to them for centuries, until they converted a wild animal into a domesticated one. Again, it was these Incas who cultivated the potato, for it grows wild in Chile and Mexico, where it is about the size of a walnut. By their care and skill the Incas made this the highly cultivated plant which was introduced into Europe, and all parts of the world since. The number of names for the different cultivated varieties of potatoes, both in the Quichua and the Aymara languages, is a proof of the high state of perfection to which the Incas brought potato-cultivation. Look too at their maize! there is none in the world like it, and it has been so for centuries. One cob of Cuzco maize is equal to five or six of any other kind. We owe to them the fleeces of the alpaca, the potato, the magnificent maize, now introduced into India; and we also owe to them the coca, whose medicinal virtues have been so lately discovered. Coca requires more care in its cultivation than tea; the leaves must be picked at a particular moment, the soil must be carefully attended to, the crop must be dried with the greatest care, and altogether there are very few cultivators who could turn out the leaf in the form and shape produced by the Inca Indians. I trust that will be remembered, in introducing immigrants into Peru. Enormous quantities of cereals, of sugar and coffee, will be raised in Peru when the number of cultivators is increased by immigration. But efforts should also be made to learn from the Incas their art of maintaining the quality of their products. I am sure that all geographers will welcome the work now being done by the Peruvian Corporation in this interesting country, of which we are so anxious to learn more, and we shall look to them and to the admirable work of the Lima Geographical Society for very large additions to our knowledge of the land of the Incas.

Colonel Church: I do not know that there is much left to say after what you have heard. I find it difficult to know exactly what point in Mr. Rose's paper to approach. He seems to have delicately waved the fringe of geography, commerce, navigation, railway construction, and emigration, but he has opened the door to a very attractive region, the head waters of the Amazons. It is perhaps the most interesting in the world so far as its products go, its wonderful river system, the navigability of its streams, the class of population found upon them. With reference to the Ucayali and Huallaga, the two great affluents of the Amazons flowing through Peru, of course it is a great question how far they are navigable. I think Werthemann, in his exploration of 1876, pretty well established the fact that the Poroné was only navigable ten miles above the mouth of the Ene, which unites with it, and forms the Tambo,—that is to say, Werthemann found that the Tambo river was navigable 83 miles up, and then reached that series of cascades mentioned by Mr. Rose: beyond that point I very much doubt if any useful navigation will ever be effected. So far as the Huallaga is concerned, 8-fior Pezot has fixed the point correctly, I believe, at about 100 miles above its mouth, to which navigation by large steamers could be effected. Now, the Ucayali is navigable perhaps 1040 miles above its mouth, and if you will bear with me a minute I will come to a point of interest:—Iquitos, on the Brazilian frontier of Peru, on the Amazons, is 350 feet above the sea, the mouth of the Ucayali, 2320 miles from the Atlantic, is 370 feet, and the mouth of the Pachitea 500 feet, the mouth of the Tambo 830 feet, the mouth of the Ene

1000 feet. Now, when you reflect that the mouth of the Tambo is 3500 miles from the Atlantic, and that its highest navigable point, but 1000 feet above the sea, is separated by only two degrees of longitude from the Andean Pass (15,640 feet high), crossed by the Lima and Oroya railway, you get some idea of what the slope of the Amazon really is. The Amazon, from the Ucayali to the Atlantic, has an average slope of about 2 inches to the mile, and probably the last thousand miles not over a $\frac{1}{2}$ inch to the mile; that gives wonderful facilities for navigation. Now, it becomes important to know what is the balancing point, where you can, at the same cost, take the products of the eastern slope of the Andes to Europe by the way of Lima, in comparison to descending the Amazons; and, so far as I can judge from a careful examination, I should say if you penetrate by railway to the eastern slope on the Amazons, about 300 miles from Callao, perhaps that would bring you to a navigable point on the Tambo river, and the cost of transportation from that point, by way of the Pacific and Cape Horn, would be about the same as that via Pará and Liverpool. Returning, you have to travel on the Amazons against a current of 3 to 6 miles per hour, and I am afraid we should have to put a few days on to Mr. Peret's calculation as regards time; however, descending, the current is with you. Now, with reference to the construction of railways on the eastern side of the Andes: the rains that beat against the Andes have washed them out into terrific gorges, and, partly owing to the quantity of water to be dealt with, I think that it will be found that the construction or extension of the Oroya railway to a point on the Tambo will be much more difficult as regards engineering and cost than from Oroya to Lima, although that portion has been extremely expensive.* I would like to add something about the inhabitants of these regions. I do not think the valley of the Ucayali will be found to have more than 40,000 barbarian inhabitants in it to-day, and I very much doubt if it ever had over that number: probably it is the maximum number, under conditions of savage life, that it will support. Take all these forest regions at the head-waters of the Amazon, and they contain small families, which travellers have dignified as "tribes" and "nations," while they scarcely reach the dignity of an ancient phratry; the gens wander from spot to spot, being extremely nomadic, which they are obliged to be, as all these forests can support but a sparse population. Animal life is not plentiful, and fish not so abundant in the streams as one would imagine, certainly not to the extent they would be in temperate climes: it is a curious thing that where you find no birds on the shore you will find no fish in the river. The reason why there has not been any greater population in these valleys and on these forest-covered mountain slopes (capable, when cleared and tilled, of becoming the garden of the world) is, that the savage has not been able to compete with the terrific forces of nature, for he is yet there in the middle stage of barbarism. He understands a little pottery, cannot make iron, has no tools, machinery, steam, or engines to compete with nature's forces, and consequently lives on hunting and fishing; and his power to penetrate the forests is limited, owing to the tangled mass of brushwood and vegetation; of course when hard times come the Cashibos who inhabit the valley of the Ucayali eat their fellow-man, as do some of the tribes of Ecuador, on the Napo, and on the Putumayo. There is a tale told of a Mayorema chief in Ecuador, who, on his deathbed, lamented he had been converted by a missionary to Christianity; as he was crying bitterly, a traveller asked why he was doing so? and he said he had deserted the faith of his fathers, if he had remained true to it he would have been killed and eaten by his relatives, but now unfortunately he had to be eaten by worms. The products of the Amazon

* We are informed that a new route has been adopted, by which, it is stated, the line will be constructed without difficulty.—Ed. 'Proc. R.G.S.'

valley exported from Pará are purely those of the forest; I suppose in the valley, aside from what is tributary to the Andes, there are not 10,000 acres cultivated in that 2,400,000 square miles of country. In 1851 the exports from Pará, at the mouth of the Amazon, were only 400,000*l.*, in 1868 they had reached 1,100,000*l.*, in 1891 the export of indiarubber alone was 18,000 tons, worth 5,000,000*l.* Now a great deal of that went from Peru, and a great deal more went from above the falls of the Madeira, from the Mayu-tata, and from the lower Beni, rivers of Bolivia, which were unexplored twelve years ago. I only mention these things to show if the products of the forest can give such abundant commerce, what can these countries yield when they are touched by the forces of civilisation?

The PRESIDENT: We are much obliged to Mr. Ross, much to the Peruvian Corporation, much to Sir Alfred Dent, and hardly less to the gentlemen who have taken part in the conversation which followed the paper, not the least, I think, to Colonel Church, for his extremely well composed and valuable speech. It would be your desire, I am sure, that I should return in your names your thanks to each and all of them.

GEOGRAPHICAL EDUCATION: THE YEAR'S PROGRESS AT OXFORD AND CAMBRIDGE.

The Council have received the following reports of the year's progress from the Reader in Geography at Oxford and the Lecturer in Geography at Cambridge:—

Oxford, 21st June, 1892.

To the Council of the Royal Geographical Society.

GENTLEMEN,—I have much pleasure in presenting to you my fifth annual report. It marks the conclusion of the term for which the Readership was originally established. As a consequence of the recent renewal of the agreement between the Society and the University, we now enter on a second term of five years, with prospects which I think may fairly be described as bright.

During the past academical year I have delivered the usual course of lectures. The attendance of graduates and undergraduates reading for honours in Modern History was as follows:—In Michaelmas Term, 33 from 8 colleges; in Hilary Term, 26 from 8 colleges; in the Summer Term, 17 from 8 colleges. The gradual reduction in the numbers indicates the change in the subjects discussed, from the more to the less frequently studied. Among my students in the third term has been a graduate of Harvard College. There should be added to the numbers just given, 14 registered students of the Association for the Education of Women in Oxford, nearly all of whom attended throughout the year; 7 of them were from Lady Margaret Hall, and 4 from St. Hugh's Hall. I may perhaps mention in this connection that I have recently been appointed an *ex officio* member of the Board of the Faculty of Arts

(Modern History), the body in the University whose function is to regulate the studies and examinations of the Honour School of Modern History.

On the physical side, my instruction has been required by only two undergraduates. The hope of a larger class, which was expressed in my last report, has been frustrated during the past year, at least, by the extreme paucity of students working for honours in those departments of physical science to which geography is an auxiliary.

The first election to the studentship in Geography, established conjointly by the Society and the University, was held at the end of February. The examiners were the warden of Merton College, Mr. Francis Galton, Mr. E. Armstrong, Mr. D. W. Freshfield, and myself. Four candidates presented themselves, and the studentship was awarded to Mr. G. Brindes Grundy, B.A., of Brasenose College. Mr. Grundy is preparing to do some work in Bæotia. I should like here to chronicle the appointment to the cartographical establishment of the Society of one of my students, Mr. B. V. Darbshire, B.A., of Trinity College.

Some additions have been made during the past year to the apparatus at my disposal, and we have now, for the illustration of lectures, besides some seventy-five hand-made diagrams, about twenty-five of the best obtainable printed wall-maps.

In connection with the Oxford University Extension, I have delivered sixty-eight lectures during the past winter at Clevedon, Swindon, Reading, Brighton, Kidderminster, Stourbridge, Stafford, Hebden Bridge, Skipton, and Bradford. There has been noticeable a distinct increase in the demand for lectures on Geography proper, as opposed to mere Physiography. Commercial Geography is also beginning to attract attention, especially in connection with the County Council grants for technical instruction.

Together with Dr. Mill, I again examined for the Commercial Certificates of the Oxford and Cambridge Board; also for the Lower Certificates of the same authority. At the request of the Delegacy, I drafted new *syllabi* to govern the papers in Physical Geography of the Oxford Senior and Junior Local Examinations.

During the coming year, what may be called the extra-mural duties of the Reader are likely to be considerably modified. My recent election to a Studentship at Christ Church will have the effect of limiting my extension-lecturing to Reading and two or three other towns in the south of England. We hope, however, soon to place other lecturers in the field, to carry on the geographical work as hitherto. A scheme for educational lectures in London during next winter is in preparation, in accordance with your request, and will soon be presented for your approval.

Lastly, I am able to report that I paid a visit to the United States this spring, and that I made enquiries as to geographical teaching at

Harvard, Princeton, and Johns Hopkins Universities. The geographical laboratories in the charge of Professor Davis at the first-named of these institutions were especially striking. They were organised about three years ago, and the collections are still rapidly growing. Comparative freedom from the pressure of examinations gives to Professor Davis an opportunity of which he seems to be availing himself to the full. At none of the three Universities visited was the application of geography to history a subject of special study, though there seemed to be some disposition to take it up at Johns Hopkins, as was to be expected in a college with a geographer as President. Professor Libbey, at Princeton, seems to work in especially close relations with the Professor of Geology. Of the lower grades of geographical instruction I learnt a little at Philadelphia, where I had the pleasure of meeting nearly 1000 teachers, and of speaking to them on the subject of the teaching of geography. Dr. MacAlister, now President of the Drexel Institute, gave a special impetus to geographical teaching when he was superintendent of education for the city. Clay-modelling is apparently the favourite method of impressing facts on the minds of the children.

H. J. MACKINDER, M.A.,

Reader in Geography.

CAMBRIDGE, 6th May, 1892.

GENTLEMEN,—I have lectured, this year, in the Michaelmas and Lent Terms, on the physical geography of the land; dealing more particularly with the development of the various types of land surfaces under climatic and other agencies.

I was fortunate enough to be put in possession of an excellent room in the new museum, where I have been able to keep conveniently my maps and diagrams, and other articles of illustration, as well as, to some extent, to use it as a practical room. I also was given the use of the Comparative Anatomy Lecture Room, immediately adjoining. I therefore began lecturing, this year, under much more favourable circumstances than formerly, and it may have been due in some measure to this that the attendance was more numerous than formerly.

For the course which extended over the two terms the attendance varied from eight to twelve, most of whom attended regularly.

Besides this course of lectures, I gave in the last term historical instruction in general geography to the two candidates for the Teachers' Examination.

On the whole the prospects seem to be much more encouraging than they were.

J. Y. BUCHANAN,

Lecturer in Geography.

The late Professor E. A. Freeman and his Services to Geography.

THE close connection between history and the science of geography has been established by the late Professor E. A. Freeman, whose melancholy death took place at Alicante on the 10th of last March. It is to Freeman, more than to any other writer of modern times, that the recognition is due of the necessity for a geographical training and geographical instincts in a true historian. He held that the physical geography of a country always has a great effect upon its political geography, and that the historian has to deal with the nature of the land and with the people who occupy it, so far as political divisions have been influenced by them. In his view the historical geographer had to draw the map of countries with which he was concerned, as they appeared after each of the different changes which they have gone through, and then to point out the historical causes which have led to the changes in the maps. Hence his valuable atlas accompanying the volume on the historical geography of Europe. But his sense of the importance of geography, for the adequate treatment of historical narrative, went much further than this. He also held that an historian ought to be personally acquainted with the localities he has occasion to describe; and he even looked upon it as a great advantage if his descriptions are written on the spot. In the preface to his 'History of Sicily,' Freeman wrote:—"The 'History of Syracuse is best studied and best written in the island of Ortygia. The tale becomes more living when one can write down the legend of Kokalos and the history of Ducotina, on the evening of a day spent on the height of Kamikos, or on the shore of Kalé Akté.'"

In his own life-work the great historian carried out this view of his duty with untiring zeal and thoroughness. Every spot of the slightest interest in connection with the Norman Conquest, both in France and England, was not only visited by Freeman, but examined with that geographical insight which he possessed in a high degree. He did not, however, trust solely to the rare gifts with which he was himself endowed. He gladly sought the help of others, and he often enjoyed the companionship of his friend Mr. Boyd Dawkins, when he examined historical sites. It is to this conscientious geographical research that we owe such masterpieces of writing, as the accounts of the battle of Assandun, of William's march from York to Chester, of the defence of the Isle of Ely, of Val-es-duno and of Senlac. When Freeman undertook to write his work on Sicily, he gave even a larger place to the geographical side of history, describing the shape of the island, the physical aspects of the country, its coasts, rivers, and mountains, with minute care. Such a foundation, laid by a master hand, was necessary for the perfection of the historical superstructure—left, alas! unfinished, but in no sense a ruin. His love of his west-country home, almost within sight

400 GEOGRAPHICAL EDUCATION :

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of the grand old cathedral of Wells, comes out whenever he sees any analogy in the hills of Sicily or of Greece. To the south of Syracuse the English historian finds "flat-topped heights ending in bold bluffs, after the manner of the hills of Somerset," and "ravines reminding of the combes of Mendip."

There is a fine example of the way in which historical events are entwined with the physical geography of a region in Freeman's noble description of Mount Etna. "The mount of mounts stands alone, without fellow, almost without vassal. It is a fortress soaring over a subject land, untouched and unapproached by ought save its own bastions and outposts. Rising, as it does in its solitary greatness, far above all the heights of Southern Europe, its bulk is so vast, its base covers so wide an expanse of ground, the slope of its sides is so gentle, that in most parts the torc of snow which parts the fruitful lower slope from the fiery summit, is needed to remind us how far loftier it is than all the other heights of the island. It has had no small share in the making of the island, and in working out its destinies. Its fire-floods are recorded as far back as our annals take us. Etna sent forth his floods to make, in the peninsula of Naxos, the first home of the Greek; he sent them forth to change the shape of the coast of Catania, in days when Sicily had no better king than Charles II. of Spain. He has been mighty to destroy, but he has also been mighty to create, and to render fruitful. If the fiery streams have swept away cities and covered fields, they have given the cities a new material for their buildings; they have given the fields a fresh soil, rich above all others in the gifts alike of Libera and of Liber."

Freeman visited and examined every nook and corner of Sicily that had any relation to his work with conscientious care, from one end of the island to the other. His last journey to Spain was undertaken with the object of learning somewhat of the topography of the Phœnician settlements with reference to his Sicilian work. He was examining everything with his usual completeness and energy, and making copious notes on the places he visited, until he was seized by his last illness. So that he may truly be said to have fallen a victim to those geographical instincts which have given such vigour and freshness to his narratives, and added so immensely to their value.

"Called to his rest—tho' not on that loved strand
That claimed his last life-labour, now denied
Its high fulfilment!—yet he sleeps beside
Blue Mediterranean waters, in a land
Of palms and columns, overtowered of old
By the tall rock whose sunlit bastions brought
Light to his darkening eyes. There, too, twice rolled
Th' '*Eternal Strife*' whose island-bulds he sought
From Mongibello to the wind-swept crest
Of Julian and Astartè."

Mr. Boyd Dawkins, whose knowledge as a geologist and a physical geographer made him a most valuable companion in visiting historical sites, thus writes of his old friend:—"Mr. Freeman rarely wrote about any place without having visited it, sketch-book and note-book in hand. As an example of the results of his method, I would refer to the graphic account of the battle of Senlac. Before it was written Mr. Freeman spared no pains in working out the minute topography, and made use of all the information which I happened to possess as one of the geological surveyors of the district. In his narrative of the last great battle between Eadmund and Cnut at Assandun, every minute detail of the ground was verified by Mr. Freeman and myself on the spot. We also obtained curious incidental evidence that the Ashington of the maps is the Assandun of the 'Chronicle,' in the fact that the latter pronunciation lingered in the district as late as 1867, in spite of the modern spelling. In collecting materials for the 'History of Sicily,' the last, and certainly not the least, of his works, Freeman took the greatest possible care to acquaint himself with the geographical conditions, and even the geological structure, of the island. His second chapter contains, perhaps, one of the best descriptions ever written of any island. He took the keenest interest in the lava floods which overwhelmed Catania. I well remember an occasion when we were discussing the impossibility of fixing a date for events of which there is no chronological record. He suddenly burst into the conversation with a reference to the lava which forms the black crown of the cliffs at Catania:

"For all the other strata
There are no certain data;
But this one may be reckoned
Of the time of Charles the Second."

"For extent of travel, and for the faculty of restoring the configuration of a country to the time of which he treats, Freeman stands without a rival. None who ever sat at his feet as he fought over again the battle of Senlac on the field itself in Battle Abbey is likely to forget that he was a great geographer as well as a great historian. The study of geography has received an important impulse from the work of Freeman, and that science is likely to occupy a far higher place than it now enjoys in the histories of the future."

Freeman's geographical talents are thus described in a letter by an Oxford friend who knew him intimately:—"I dwelt on his services and devotion to geography, because they always struck me as one of his great claims to a permanent place among historians. Here he was (as in several other things) a true disciple of his great master, Thucydides, the greatest geographer among the great historians. It was a lesson to see him looking at a landscape or a great building. The trend of the ground; the geology; the military,

commercial, and agricultural advantages and disadvantages of the site; its impressiveness and its significant character seemed to rise up in his mind with a force and distinctness such as I have never seen in any one else. He had the eye of a sportsman for ground, though he would have laughed at my comparison. I have never seen the gift in anything like a high development save among sportsmen, he being the only exception. He was a good map reader, too, understood the meaning of a map, could see the places as they stood, and their outlook and general appearance. This is the special gift of a sailor or an engineer, but he had it. He found no difficulty in carrying in his head a mass of memoranda about places he had seen, and this is generally only found among artists. Yet he was not an artist at all (save in words), and had such an absence of feeling for colour, that it seemed to me quite noticeable. As an architect he had a keen sense of form and proportion and of the facts of construction, and a hatred of sham and useless detail. Of his influence in directing people's attention to the vital importance of geography, it is almost impossible to speak too highly. We have all learnt this from him. It permeated all he ever wrote, and much of his talk. It is only true that he died a martyr to it, and it would have been his choice, I think, to die a victim to research rather than in any other way."

The influence of Freeman's example and teaching will be lasting. He has given to geography its true place in relation to the study of history, and in doing so he has done most valuable service to both departments of knowledge. He has set the example of a historian working as hard and as systematically in the field as in his study; and his method will add a far wider and more numerous class of inquirers to the votaries of geographical science. It is from this point of view that geographers most appreciate the great historian's life-work. But there are many who, while lamenting the calamity which has deprived the country of one who was still in the full enjoyment of his great powers, also deplore the loss of a sympathising, large-hearted, and affectionate friend.

C. R. M.

Direct Communication between Upper Assam and Northern Burma.

THE ranges of hills which lie between the valley of Eastern or Upper Assam and the great Hukong (Hookhoom) valley, on the Upper Chindwin river in Northern Burma, have long presented tempting lines for direct communication between Burma and Assam. They are of no great breadth, not much exceeding 100 miles as the crow flies; and they are not of exceptional height, the highest points little exceeding 8000 feet, and there are long stretches of range under 4000 feet. But they are covered with a dense growth of forest and jungle, and they are very sparsely inhabited, and large portions are wholly uninhabited. The villages are few and small, and

have little food to dispose of; thus any party of more than a very few persons which attempts to cross this region has to take with it fifteen to twenty days' supply of food for every member of the party, and the whole of this food has to be transported on the backs of carriers, who are only to be obtained with great difficulty, and for whom food has also to be provided. Thus the attempt to move any but a very small number of men across this region necessitates elaborate preliminary arrangements for the provision of carriers and food. And this is the main difficulty of the journey.

The first Englishman who is known to have crossed from Upper Assam into the Hukong valley is Dr. W. Griffith, who, in the spring of 1887, travelled from Assam under instructions from the Government of India, to effect a meeting with Dr. Bayfield, who was then travelling from Ava, the capital of Burma, northwards, with the hope of reaching the frontiers of Assam. Dr. Griffith started from Sadiya and travelled, via Keelung and Kamrup Patar, to the Naga hills, which he crossed, and then crossed the Patkoi range, on the south slopes of which he met Dr. Bayfield, in the Kamiyum valley, on the eleventh day's march from Sadiya. Dr. Bayfield appears to have endeavoured to make his way on into Assam; but being unable to obtain either food or carriers, he abandoned the attempt and returned southwards, accompanied by Dr. Griffith. In four days they reached the hills on the northern edge of the Hukong valley, and on the tenth day they arrived at Maingkhwon, the chief village in the valley.

Their journeys are described in Sections 4 and 5 of the selection of papers regarding the hill tracts between Assam and Burma, which was published by the Bengal Government in 1873. This volume also contains a paper on the route from Assam to the Hukong valley by Mr. H. L. Jenkins, and an account of a trip made by that gentleman in 1869-70, across the Patkoi range, with a view to opening out the old Burmese route from the Hukong valley into Assam, which has become disused since the Burmese lost their control over Assam.

In January, 1888, an expedition was sent from Margherita—the new British station in Upper Assam, named by an Italian engineer after his Queen—for the express purpose of exploring the hill routes from Assam into the Hukong valley. It was commanded by Mr. Needham, political officer in Upper Assam, who had a few years previously distinguished himself by his exploration of the Lohit Brahmaputra upwards, as far as the village of Rima (Roema) in the Zayul valley of Southern Tibet, the point down to and below which the Zayul river has previously been surveyed downwards by the famous Trans-Himalayan explorer A—h, thus proving the Zayul river to be the principal eastern source of the Brahmaputra. In this new expedition Mr. Needham was accompanied by Captain Mitchell, of the Intelligence Department, Captain Molesworth, of the police, and Mr. Ogle,* an officer of the Survey Department, who had already done much excellent work in Assam. The expedition started from Margherita on the 4th January, 1888, and returned on the 28th of the following month, after exploring a considerable tract of country, and doing much survey work in the Naga and the Patkoi hill ranges. But it was not able to make its way into the Hukong valley, chiefly because of the failure of the efforts to obtain either a sufficiency of food on the spot or porters to convey food from a distance.

Towards the end of last year arrangements were made to push up a small detachment of the British troops in Burma into the Hukong valley, and Mr. Needham

* We regret to say that this gentleman, who had received a gold watch (the Gill Memorial) from this Society in recognition of his services, has recently died in England. An obituary notice of him appeared in the May number of the 'Proceedings.'

was directed by the Chief Commissioner in Assam to again endeavour to make his way across to that valley, and effect a meeting with the troops coming up from the south. This he eventually succeeded in doing, with entire success, but with very great difficulty in providing the requisite supplies of food for his party, which had to be done from Assam for the journey both ways. He started from Margherita on the 15th December, with a detachment of 100 men of the Assam police, under Captain Maxwell, and took the route to Phung, which lies through a tribe of Nagas called the Sarkaria—because they visit our frontier posts for purposes of trade—as far as the village of Gogli, after which it crosses the Patkoi at an altitude of 7200 (?) feet into the Rampong Naga country, Phung being about half a day's journey south of that range. Thence he advanced 9 miles south to Morang, where the services of 100 Nagas were obtained to carry the stores from Phung to Shauffe, the next Rampong village beyond Morang. At Shauffe difficulties were again met with in procuring carriers, so Mr. Needham sent half his detachment of police back to Phung. After crossing the Mu Bon range at an altitude of 7000 (?) feet, on the 31st December he reached Kushan, the southernmost point he had got down to in his expedition of 1888. Thence he proceeded to Khallak, the last Rampong Naga village, beyond which is the Lungwak range, which forms the boundary between the countries of the Nagas and the Singphos.

The Rampongs owe allegiance to several of the Hukong chiefs, having been conquered by them years ago, and the powers they exercise over the Nagas is real, and will last as long as the independence of the Singphos lasts. Sombung, whose village (called after him) lies nearest these hills, is greatly feared and respected, not only by the Rampongs bordering the Hukong valley, but by those residing far away at Marong and Shauffe. The Rampongs are all human sacrificers, and the skulls of their victims, who are sometimes slaves, but oftener prisoners taken in war, are used to decorate the front verandahs of their houses.

At Khallak Mr. Needham obtained carriers for the journey on to the first Singpho village, Sombayanong—called after its head man—which is met with on entering the Hukong valley at its north-east corner. Thence proceeding onwards, and halting in succession at the villages of Mungam, Mingbu, Sima Sima—this last a place on the Turong tributary of the Chindwin river, which is marked Old Bisa in former maps—and Duffa Bong, Mr. Needham marched into Maingkhwon on the 14th January, and joined hands with the Burma force 31 days after leaving Margherita.

The Burma column consisted of 50 Europeans of the Devonshire Regiment, 100 Sikhs of the 3rd Burma Regiment, a mule battery of two guns, and 16 officers, under the command of Major Dalzell.

Maingkhwon is in the neighbourhood of the famous amber mines, which occur in low hills much bored over by Singphos, who employ themselves in searching for amber; but they meet with very uncertain success, often finding nothing and rarely much. The country is very sparsely populated, excepting to the eastward, where the Khakhs, or hill Singphos, reside; these people derive their name from the words *Khâ* a river, and *Khâ* the head, so that the designation means the Singphos resident near the sources up the great (Burman) rivers.

Major Dalzell had such difficulty in obtaining a sufficient supply of food for his own detachment from the surrounding villages that he could only furnish very little for Mr. Needham's party. Consequently after three days' halt at Maingkhwon, Mr. Needham commenced his return journey to Assam. He had fortunately left supplies of food at various places on the line of route, so that his return march was not impeded by this difficulty. He accomplished the journey in 16 days, exclusive of two halts, and arrived at Margherita on the 4th February.

Owing to the trying nature of the marches, ascending or descending several thousand feet daily, the route taken by Mr. Needham will never be a favourite one; while the high altitudes at which the Patkoi, the Bun, and the Lunwak have to be crossed would make it very difficult to construct even a bridle path through this country. It is believed that a much better road could be made along the old line of route of the Burmese armies invading Assam. This line crosses the Patkoi at a point south-east of Sadiya below 3000 feet in height, and descends gradually to the Nongyong Lake (height 1200 feet) and continues via the Loglai—which flows eastward into the Turong—to the Singpho village of Huma Yung, and thence via Natka, N'Bento, the Fanglai and the Kholung streams, to Ningbu village, which is only three short marches from Maingkhwon. The present drawback to this route is that there are only two villages between Assam and Ningbu, but there are absolutely no high mountains to cross, as on the other route. Many years, however, may elapse before a good road is made over either line of route, and before the country is sufficiently populated and civilised for the road to become a serviceable trade route between Northern Burma and Eastern Assam.

GEOGRAPHICAL NOTES.

Ibero-American Congress.—The Geographical Society of Madrid, as has already been announced, is organising an International Congress, to meet in Madrid in the end of October, 1892, in order to discuss the present state and future prospects of the Latin races and languages in America. The programme of the meeting contains nine articles dealing with those physical, political, and commercial problems, the solution of which is necessary for the future prosperity of South America. The final resolution is a declaration of the necessity for a union of the whole Latin race in order to counterbalance the power of other races and maintain the general peace.

Moscow Geographical Exhibition.—A Geographical Exhibition will be opened this summer at Moscow, in connection with the two International Congresses of Prehistoric Archaeology and Anthropology, which are to be held in the ancient Russian capital. The General Staff will exhibit a collection of all the maps, descriptions, and surveys made by Russian travellers in Central Asia, China, and Korea, which are deposited in the Topographical Department of the General Staff and the Scientific Military Committee. They will show also the recently-published maps, based upon surveys in the Empire and adjacent countries. A catalogue of these works is now in preparation.

Liverpool School of Navigation.—Many of the Fellows of this Society will doubtless remember the very able paper by Mr. Clements R. Markham, which was published in the 'Proceedings,' May, 1882, "On the Instruction at Present Supplied in this Country, in Practical Astronomy, Navigation, Route Surveying, and Mapping." In this paper the author strongly advocated the extension of education

in subjects required by practical geographers and explorers by sea and land, and that the President of the Board of Trade should raise the standard of examinations for masters and mates in accordance with the intention of the Board, as announced in the circular of 1850. In the course of his paper, Mr. Markham showed how much was being done for the scientific education of seamen in foreign countries, as compared with the little interest shown in Great Britain with regard to the training of those whose avocations take them to distant regions by land and sea. The recommendations contained in this paper were approved of by the Council of the Royal Geographical Society, and ordered to be published in the 'Proceedings.' In furtherance of this object Mr. Markham also delivered a lecture at Liverpool, in which he urged the necessity of establishing a navigation school in that city; and though ten years have elapsed since that time, it is more than probable that the efforts which Mr. Markham then put forth have had their influence with the Corporation in deciding to establish a municipal school, where navigation and nautical astronomy will be thoroughly and efficiently taught. In the list of schools given at the end of the paper, Liverpool is mentioned as having the "Indefatigable" training-ship, where navigation alone was taught, and the "Conway," where instruction was given in both navigation and nautical astronomy. In a previous part of the paper it is also mentioned that there is a class for instruction at the Sailors' Home, conducted by Mr. Gill, "a very efficient teacher"; and in a footnote attention is called to the fact that this class was originally formed by the Board of Trade in 1853. But since this educational experiment of the Board was abandoned, the class has been carried on by Mr. Gill entirely on his own responsibility. This is the gentleman who has been appointed as head-master to the Liverpool School of Navigation. He has always been looked upon as the head of his profession in Liverpool, and judging from his high attainments, and the energy he has displayed in the past, there can be no doubt but that in the future he will carry out what Mr. Markham so strongly advocated ten years ago, and what the Corporation of Liverpool now embody in their circular on the duties of the head-master, viz., "Do all in his power to advance the standard of education in the merchant service."

"Worcester" Nautical Training College.—For the past twenty-four years the "Worcester" has been commanded by Captain J. Henderson Smith, F.R.G.S. (Lieut. R.N.R.). Under his able management she has become in all respects a thoroughly efficient nautical training college. The time has, however, arrived when Captain Smith wishes to retire, and Captain D. Wilson Barker, F.R.G.S. (Lieut. R.N.R.), has been appointed as his successor. It is interesting to note that Captain Barker commenced his career as a cadet on board the ship he is so soon to command. He is an officer of scientific attainments, especially as a geographer and meteorologist, has written on the history of scientific instruments, and has delivered some highly instructive lectures in connection with his profession.

Professorship of Historical Geography.—The 'Revue de Géographie' states that the chair of History and Morals (*Histoire et Morale*) in the Collège de France has been reconstituted as a chair of French Historical Geography. M. A. Longueu will be the first professor.

The Projected Drainage of the Neusiedler Lake.—The gradual desiccation and frequent total disappearance of the Neusiedler Lake have induced the Hungarian Government at last to take steps for its drainage by means of a canal into the Raab. At the present time it is

stated that at the deepest points of the lake there is not more than three feet of water; so that the opportunity is favourable for carrying out a scheme of drainage which would result in a large tract of country being reclaimed for agricultural purposes.

Currents in the North Sea.—A sealed bottle containing a paper requesting the finder to report the place and date of discovery was thrown into the sea at Coatham Pier, Redcar, by Mr. T. M. Follow on October 8th, 1891. On April 12th, 1892, the bottle was picked up by a fisherman off the island of Hjelmessö, in the extreme north of Norway. The bottle had been immersed for six months, and the shortest distance between the two points is 1400 miles. This observation confirms the general set of the currents from the east coast of Britain, at first southeasterly and then northerly along the continental coast, as shown in Mohn's map of surface drift in the North Sea and Norwegian Sea in Petermann's 'Ergänzungsheft' No. 79, for 1885.

Exploration in Caucasia.—The Russian 'Official Messenger' (April 22nd) announces that the Ministry of Domains has decided to make, next summer, the following explorations in Caucasia:—(1) The exploration of the mineral springs of the Eastern Caucasus having now been completed, to carry out a similar work in Central and West Transcaucasia; namely, the mineral waters of Khvedur, Uravel, Tsikuban, Platen, and others, in the governments of Tiflis and Kutais, and in the Chernomorsk District; (2) to continue the systematic geological exploration of the government of Tiflis, especially of the valleys of the Yora and the Alazan in Kahetia, and their mineral resources, in view of the projected construction of a railway in Kahetia; and (3) as the detailed study of the Apsheron naphtha region was terminated last year, and the map of the region is ready, to complete the exploration of the Caspian coast naphtha region, and to explore the nickel ores of Daghestan. The geologist Simonovich and the mining officers Konshin, Barbot-de-Marny, and Gavriloff, are commissioned for this purpose, while M. Rughevich is commissioned to explore the naphtha region along the new Petrovsk branch of the Vladikavkaz railway, which yielded last year 15,000 tons of naphtha, and promises to become an important centre of naphtha industry.

M. Cherski's Exploration of the Verkhoyansk and Stanovoi Mountains.—The first stage of the important expedition which, under the leadership of M. Cherski, is charged with the exploration of basins of the Kolyma, Indigirka, and Yana, has been accomplished by the journey from Yakutsk to Verkhnoye-Kolymsk. Baron E. v. Toll communicates to the current number of Petermann's 'Mittheilungen,' an abstract of M. Cherski's letters to the Imperial Academy of Sciences of St. Petersburg, under whose auspices the expedition has gone out. The expedition left Yakutsk on the 14th of June, 1891, and, after crossing the Aldan, travelled up the River Chandyga, through the narrow fore-

ground of the lofty Verkhoyansk range. Following the left affluents of the Chandyga, the traveller penetrated into the heart of the mountains, amid summits which are of Alpine character, but are below the snow-line. The route then takes a sharp bend to the east-south-east to the River Dyba, a tributary of the Tyra, and leads down gradually into the valley of the Omekon. The natives regard the latter river as the real head waters of the Indigirka. In this district the sources of the Kunku and Kente were crossed; the Uchngai-ursch empties itself into the latter of these streams, and not into the Omekon, as shown on the maps. The expedition then crossed the Verkhoyansk mountains at the point where they separate from the Stanovoi range. Here the former has an almost southern trend, while the latter runs in an easterly direction. The region between the Indigirka and the Kolyma is covered by the bend of the Stanovoi mountains, which are split up into several sub-divisions. The expedition crossed this latter mountain system by three main ridges. The first-named, Tas-Kystahyt, forms the crest of the chain which lies nearest to the Indigirka, and, at the same time, the watershed of the little rivers Ohuruktá and Nera. The second saddle lies further to the north-west, and separates the system of the Nera from that of the Moma. It bears the name of Ulachan-chistai—"the great woodless region." The third mountain ridge forms the water-divide between the Indigirka and Kolyma. This is the southern part of the mountain range called on the maps Tomus-chaja, and its direction is north-north-west. From one side of it rise the head waters of the Moma, and from the other those of the Syrjanka, which joins the Kolyma below Verkhnoye-Kolymak. The summits of this chain gradually decrease in height, and lead down in an easterly and south-easterly direction to the Kolyma, finally giving place to a plateau, and then the tundra, in which the town of Verkhnoye-Kolymsk lies. The "town" consists of a church, the ruins of a chapel, and seven roofless houses. The Russian population is composed of five families, two priests, two assistant priests, and a merchant. M. Cherski made this place his winter quarters in order to commence from this point during the present summer the second part of his journey, viz., the boat voyage up the Kolyma. The following are some of the characteristics of the mountains through which he passed:—"The valleys are broad and gently sloping, showing frequently no traces of terraces, the latter having been destroyed by the continually-shifting course of the rivers, which, instead of deepening the valley bottoms, tend to level them up, by filling them with rubbish. The numerous arms of the rivers, often extending right across the valleys, are adorned with magnificent balsamic poplars and tall willows of striking beauty, while the northern slopes of the valleys, in contrast to the rocky southern sides, are covered in places with white reindeer moss. The meadows of the valleys foster such a rich flora that the traveller who visits this region in June and July could, says M. Cherski, forget what high latitudes he is crossing, especially when the temperature in the sun reaches 113° Fahr. Extensive ice-surfaces are found in many of the valleys, the largest seen being in the basin of the Moma. On fourteen days in August the temperature fell below freezing point, once as low as 19° Fahr., and on six days snow fell. The difficulties of travelling were caused by the frequent and difficult river crossings, the marshes, and turf moors covered with hillocks. M. Cherski made surveys of his route throughout, took barometrical observations for altitudes, and collected a vast number of botanical and zoological specimens. Special interest attaches to his observations as to the geological formation of this mountain region. Into the details of these we cannot enter, except to say that, according to him, the quaternary strata of the great longitudinal valleys of the Ulachan-Chistai may probably be regarded as having been formed by immense glaciers, thus affording another piece

of evidence in support of the existence of a glacial period for north-east Siberia. It is to be expected that his exploration of the lowlands this summer will result in the discovery of quaternary animal remains. Baron Toll calls attention to the fact that the mountain region explored by M. Cherski, which consists of alurian and triassic folds, lies in the same meridian as the new Siberian island of Kotelný, and that the mountains there, being of the same composition, are really one of the terminations of the ranges of north-east Siberia.

Lieut. Walker's Route between Burma and Arakan.—In the spring of last year Lieut. H. B. Walker, of the 1st (Duke of Cornwall's) Light Infantry, was directed to examine the lines of communication between Arakan and Burma, especially between Akyab and Myohaung, and to report on possible means of connecting the two provinces by rail. The report, which has been printed in Rangoon, and is accompanied by four rough sketch maps, deals with an obscure tract, practically unmappped up to the present, and of great importance in the consideration of railway schemes for uniting Burma and Eastern Bengal. Lieut. Walker started from Napeh, in the Minbu district of Upper Burma, on the 28th February, 1891. From Minbu to Napeh the country is fairly well known and open, but from the latter station forward the transport consisted entirely of coolies, though several bullock caravans traversed the same route (by the Aeng or Au Pass) during the time that Lieut. Walker was there. It is many years since the wild Chins committed any depredations in these parts, and the country is perfectly quiet. Lieut. Walker says the An district is one of the best regulated, best managed townships in Arakan. Here and there in the jungle are to be seen Chin villages, where the Chins preserve their habits, customs, and dress intact. The village of An is well-built, clean, and with an air of bustling activity about it; there is a fine bazaar, and plenty of river traffic to and from Akyab. Supplies are plentiful, local products being rice, fowls, vegetables, pumpkins, yams, peas, and plantains. From An the route commenced to trend north-west through a country enjoying a lovely climate, with abundance of sport. The road varies greatly; at times it is excellent, and at other times very bad, but the soil all along is good, either for road-making or cultivation. At Dalet, which is within easy reach of Akyab, by water, Lieut. Walker appears to have had full but unpleasant experience of the Arakanese, whom he considers the most indolent and cowardly set imaginable. Beyond Dalet the country becomes very bad, being swampy, or cut up with creeks in parts, and a railway would require numerous bridges, though, by hugging the foot of the Mysintaung Hills, it would be possible to avoid having to cross the majority of the swamps and rivers. After passing through Minuyab, Lieut. Walker crossed the Senu river, here nearly four miles in width, to Minhya, where there is a good deal of trade with Akyab and Kyaukpyn. He then chartered a boat and reached Myohaung, the ancient capital of Arakan. This place is a mere remnant of what it was in former days, its old magnificence being faintly attested by the wide-spreading ruined walls, and two gigantic pagodas, containing 90,000 and 80,000 images respectively. At present it contains about 2500 inhabitants, whom Lieut. Walker describes as a lazy, good-for-nothing lot, and great opium-smokers. Myohaung, or Mrohaung, was known to Ptolemy under the name of Triglyphon, and the ruins form three squares one within the other. Lieut. Walker's general verdict on the Au Pass route is, that a little labour and expense would convert it into a good bridle-road from Napeh to An, but that further on to Myohaung the expense of bridging the numerous creeks would be considerable. After resting and recruiting a short time at Akyab, Lieut. Walker made preparations for returning to Burma by the Sawbwa's route, which crosses the Yoma range about 80 miles further north

than the An Pass. For some distance the route follows the course of the Lemru river, which traverses a wild and picturesque tract, and thence strikes eastward across the hills, eventually emerging at Lnuagshe. On the whole, Lieut. Walker pronounces the Sawbwa's route as unsuitable for a railway. Its ascents and descents are far more numerous than the An Pass, and the greatest elevation, he was told, is more than 6000 feet; but having unfortunately broken his barometer on the Lemru river, he was unable to take any altitudes. Whether it will be feasible to connect Minbu (the likeliest starting-place on the Irrawaddy for the railway) with Mandalay is a matter that Lieut. Walker has not attempted as yet to investigate, but the An Pass route offers, in his opinion, by far the best medium of railway communication between Arakan and Burma.

Lieutenant von Höhnel's Expedition in East Equatorial Africa.—

In a letter to Petermann's 'Mittheilungen,' Lieutenant von Höhnel gives some particulars with respect to the important expedition which, under his leadership, is to explore the whole region round Mount Kenia and the country between that mountain and Lake Rudolph. The expedition will leave Europe about the middle of June; the cost of it will be borne Mr. W. Astor Chauler, a young American, who in 1889 undertook a hunting excursion to Kilima-njaro. The following is the plan of the expedition. The starting-point will be Lamu, and the party will proceed up the Tana River to Mount Kenia, on the northern side of which a headquarters camp will be pitched. From this point a thorough exploration of Kenia and of the head waters of the Tana, the Guasso Njiro, etc., will be made. The expedition will then move eastwards to Marsabit. It is uncertain whether an excursion will be made to the volcanic region to the south of Lake Rudolph. From Marsabit, where camels are to be had, the party will traverse Samburu Land to the northern end of Stephanie Lake, whence a survey will be made of the still unknown part of the Omo valley. Reshiat will be reached along the Omo-Nianam, and will be made a second headquarters, as from this point the Bass River and a part of the west coast of Lake Rudolph will be explored. The return journey will be effected by the southern end of Lake Stephanie in a south-easterly direction to the Chubba. The expedition, which will be provided with excellent scientific apparatus, will be away eighteen months, and there is every reason to expect valuable results to geography from it.

French Expeditions to Lake Chad.—In December last Lieutenant Mizon, finding it impracticable to reach Lake Chad from the Banne, turned south-westward at Yola, towards the Congo. On April 4th he was met by M. de Brazza at Comasa (?), in latitude 3° 40' N., a place situated on the Massiepa, a western tributary of the Sangha. The journey from Yola, a distance of over 400 miles, was made with an escort of eight natives. The people encountered were peaceful and friendly. The watershed between the Niger and Congo basins is said to have been crossed in latitude 6° 30' N., but details of the

important geographical observations in this entirely unknown region have not been telegraphed. News of Captain Monteil's expedition is telegraphed from Tripoli, where a letter has arrived by caravan from Kano, in Sokoto. Captain Monteil was in that town in January, *en route* for Kuka, in Bornu. The bare fact of his arrival in Kano is all that has been heard of this traveller since his journey to Waghadugu, which he reached a year ago, was reported.

The Country between Victoria Nyanza and Lake Albert Edward.—

In the March number we gave a summary from Captain Lugard's latest report descriptive of Eastern and Western Singo. Captain Lugard in the same report describes the country through which he passed on his journey in June and July of last year from the north-west of Victoria Nyanza, after the defeat of the Mohammedans in Unyoro, to Lake Albert Edward. The chief geographical points worthy of notice were, he says, the discovery of a lake in Buddu, and several more small ones towards Lake Albert Edward, as well as the localisation of Lake Kashera, between Ankoli and Koki, and the rectification, to some extent, of the boundaries of Koki. The latter district is nothing like the size shown on the maps; it does not run northward to the Katuga, nor south to the Kagera, but is merely a little semi-independent district more or less under Buddu. It is said to extend southwards to within some ten miles of the Kagera, and northwards not more than half-way up Buddu. The route from Bujaju, and practically the whole way from Luwambu, as far as the Albert Nyanza itself, crosses no swamps and marshes, and is, therefore, possible for a permanent road from Lake Victoria to the Southern Sudan and Lake Albert. In the hot weather there is not an abundance of water, but Captain Lugard found amply sufficient at comfortable stages. The country is by no means so destitute of food as he had been led to expect, and the Swahilis were able to procure sufficient the whole way without touching the reserve. In Western Ankoli, towards Lake Albert Edward, food is abundant and cheap; and as enormous quantities of mtama (coffee-corn) and beans, &c., are grown, the difficulty of obtaining portable food ceases; and Captain Lugard hopes that hereafter this may become one of the food-supplying centres. There is, moreover, a large variety there—potatoes and green bananas, for consumption on the spot; beans, mtama, wimbi, for transporting, &c. Eastern Ankoli is much less fertile than Buddu, the hills are higher (about 5,000 feet), and the whole country is a network of ranges of hills, with broad valleys between them. The soil is poor, and on the hills very rocky, a slaty shale being mixed with some granite. Iron is found, and the caravan passed some mines which used to be worked by the natives. The country is an endless prairie of speargrass, thickly dotted with acacia and thorn bushes. There is game in places, and elephants abound in the wet season. It is sparsely populated. Marongo lies on the boundary between Buddu and Ankoli. Koli lies to the south, and is a small district tributary to Uganda, through the Pokino. The people of Ankoli, whose king is Mtali, are nominally pure Bahima, but they are very largely mixed with Bantu races, who cultivate the soil. The Bahima themselves are purely pastoral, like the Masai, and are most distinctive in features, having high, intelligent foreheads, and bony, often aquiline, noses, like the Somalis and Gallas, from which stock they undoubtedly spring, as they themselves say. Owing to the death of all their cattle very large numbers have died, and the rest have been compelled to take to eating the produce of the land, and to abandon some of their prejudices regarding food. The cultivation of Eastern Ankoli consists of bananas, potatoes, cassava, beans of many kinds, peas, wimbi, a little

coffee-corn (mtama), maize, &c., mostly produced by the Bantu people settled among them. Koli is peopled by its own distinctive race, the Wakoli, who form the larger third of the population, but are mixed with Waganda and Bahima. The Wakoli cultivate the soil, producing the crops named above. Their chief (who ranks as equal to a chief of Uganda) is named Kamwaga. His capital is at the south of Lake Kasheba. Throughout this somewhat sterile country, which, however, affords plenty of pasture for cattle and transport animals, there grows a very great deal of the thorny acacia (babul), a favourite camel fodder; nor is there, Captain Lugard thinks, any obstacle to the employment of camels on this route from Suwamba. The Somalis, who are essentially camelmen, pronounced it admirably adapted to the camel.

Dr. Drygalski's Expedition to West Greenland.—At the meeting of the Geographical Society of Berlin, on the 7th May, Baron Von Richthofen announced that the expedition to West Greenland, under the leadership of Dr. E. V. Drygalski, left Copenhagen at the beginning of May. The main object of this important expedition is to study the inland ice, and the movements of the glaciers which project down to the coast, together with the physical causes of these movements. The party will remain at least a year on the spot, in order to make observations at different seasons of the year. The observatory will be erected at Umanak Fjord ($70\frac{1}{2}^{\circ}$ N. lat.), between the Great and Little Karajak glaciers, that point having been selected by Dr. Drygalski as the result of his preliminary expedition last year. Dr. Vanhoffen, the zoologist, and Dr. Stade, the meteorologist, are members of the expedition. The former will concern himself with the geological and botanical part of the work. The cost of the expedition will be defrayed partly out of the Carl Ritter bequest of the Geographical Society of Berlin, and partly by means of contributions from other sources, including a substantial grant from the Government.

Visits to Buhutu and Wari Tribes, British New Guinea.—In one of his recent tours of inspection, Sir W. Macgregor, the Administrator of British New Guinea, made a visit to the Buhutu and Wari tribes, inhabiting the eastern end of the Possession. The Buhutu people live in the mountain ranges that culminate in Mount Gugusara (Cloudy Mountain). On leaving Samarai, Sir William proceeded overland from Milne Bay to Pouro (Mullen's Harbour). The low range (Kaisabu) which separates the two bays (Pouro and Milne Bay) rises to 2000 feet, is wooded, and composed of lava and raised coral limestone. The village of Sagara is situated on the river of that name, and is distant about 15 miles from Maiwara. The people were found to be quiet and friendly. During this tour some dozen of the Buhutu villages were visited. The inhabitants are apparently quiet and peaceful. Among the other tribes described in the despatch are the Tamoro, located at the head of Pouro. They are stated to be hospitable, peaceful, and trustful. The Suabina tribe are located in the Orangerie Bay district, and were found to be friendly disposed. The tribe next to Suabina is that of Laimodu. They live from one and a half to two miles west of Sumbina. The river of Sagamodu falls into the sea about half a mile east of Laimodu. Between Laimodu and Suabina the beach is formed of hard basaltic sand and shingle. For several miles inland, to the foot of the spurs of the main range, the ground is described as flat, and much of it apparently wet. Some

two or three miles west of Laimodu there is stated to be another large tribe, the Godaisu. They occupy a point that projects into the bay, which, it is said, is the only place where a vessel could find anchorage between Suabina and Bathara. They are described as a powerful tribe, but were quiet and friendly. The lands of Godaisu apparently extend about a couple of miles west of the River Kilauna, where they meet those of the Modirisibu tribe. The country near the sea is described as being of the same character as that between Suabina and Laimodu; but west of Modirisibu the soil becomes more sandy. Wari village lies about a mile west of Modirisibu. The general attitude and conduct of these Orangerie Bay tribes were apparently obedient, trusty, and friendly.

Upraised Coral Islands off New Guinea.—In the course of a journey through British New Guinea, in January last, the indefatigable Administrator, Sir William Macgregor, examined and described several remarkable islands, which he shows to be almost certainly ancient atolls that have been elevated by steady horizontal uplift. The island generally known as Kitava (but called Nowau by the natives) has an area of about five or six square miles. It appears to be surrounded by a fringing reef. Nearly all round the island there is a low and slightly sloping margin covered with trees, and about a quarter of a mile wide. This terminates inland in a steep coral wall, which rises abruptly to the height of 300 or 400 feet, and is covered with forest. Shells in the coral point to a comparatively recent upheaval. From the crest of this wall the land dips gently to a plateau from 50 to 100 feet lower, which occupies the centre of the island. The plateau is undulating, has a rich chocolate soil, and being protected from wind by the raised rim, whilst subject to a copious rainfall, it is very fertile. All the people live in the hollow, so that from the sea the island seems to be uninhabited. The central hollow is drained by filtration through the cracked and porous coral rock. Kwaiawata Island, which is from one and a half to two miles in diameter, showed precisely the same form and structure, and in Gawa Island there is a still more perfect instance of a raised atoll. The coral wall in the last instance rises so abruptly to the height of about 400 feet that part of it has to be climbed by ladders, and the plateau representing the old lagoon is nearly 100 feet below the level of the edge. Iwa, another adjacent island about a mile in diameter, is of the same kind, only the gently sloping border has been worn away, and the coral cliff meets the sea nearly all round. These remarkable islands merit more detailed study by a geologist on account of their obvious bearing on the theory of coral formations, and their resemblance to the upraised reefs of the Solomon Islands. It would appear that the area of post-tertiary elevation which Dr. Guppy demonstrated in the Solomon Islands must be extended to include the border islands of New Guinea as well.

Antarctic Whaling Cruises.—Besides the whaling expedition referred to in the last number of the 'Proceedings,' three other vessels, the *Diana*,

Balaena, and *Arctic*, will leave Dundee this summer with the same object in view. Probably there might be no objection to give accommodation to one or more scientific gentlemen on board these vessels. Communications on the subject should be addressed to Mr. David Bruce, 3, Royal Exchange Place, Dundee.

Obituary.

General Sir Lewis Pelly, K.C.B., K.C.S.I., M.P.,* whose death, in his 67th year, occurred at Falmouth on the 22nd April last, bequeaths one more to the list of distinguished careers which illustrate the value of our Indian Services in eliciting individual qualities that in England have but scant opportunity for exercise. Son of the late John Hinde Pelly, Esquire, of Hyde House, Gloucestershire, and educated at Rugby, he had only just entered his sixteenth year when he received his first army commission; and a glance at his officially-certified record of service, from that period up to the date of his cessation from active employment in India, some forty years later, will afford ample evidence of the high and varied character of his professional work. It is only just to his memory that this should be reproduced, in however summary a manner.

Joining the 17th Bombay Native Infantry as Ensign in 1841, serving on the Regimental Staff † in 1842, and promoted to Lieutenant in 1843, Lewis Pelly acted as Assistant to Colonel Outram and other Residents at the Gáikwár's Court in 1851-52, and was transferred to civil employ in Sind in 1853. Brevet-Captain in 1855, and Captain in 1856, he officiated in the latter year as Personal Assistant to General John Jacob, Acting Commissioner in Sind, and, in the following year, joined the Persian Expeditionary Force as A.D.C. to that officer (nominated to the command of the Cavalry Division), and was shortly afterwards made Political Assistant to Sir James Outram. After the Persian war—for which he received the medal and clasp—in 1858, he was Major of Brigade to the Irregular Horse on the Sind Frontier. In 1859-60, acting as Secretary of Legation at the Court of Persia, he became *Chargé d'Affaires* on the retirement of his cousin, Sir Henry Rawlinson, and was sent on a mission from Tehran to Herat, proceeding thence to India, *via* Sistan, Afghanistan, and Baluchistan. In 1861, promoted to Major, and summoned to Calcutta, he was despatched to the Comoro Islands; and in 1861-62 he acted as Consul on the east coast of Africa. Later in 1862 he was appointed Political Resident in the Persian Gulf, with increased rank (1863) of Lieutenant-Colonel. In 1864 he negotiated a Telegraph Treaty with the Imám of Muskat, and in 1865 visited the chief of Nejd in Central Arabia. Made C.S.I. in 1868, he was promoted to Colonel in 1871, and in 1872 he accompanied Sir Bartle Frere on a mission to the east coast of Africa. In 1873 he was appointed Agent to the Governor-General for the State of Rajputána. In 1874, made K.C.S.I., he was further nominated Special Commissioner at Baroda; while in 1875 the duty devolved upon him of arresting H.H. the Gáikwár, and assuming the direct

* By General Sir Frederic J. Goldsmid, K.C.B., C.B.

† The Colonel was very much amused at his asking for the Adjutancy of the regiment, as he looked such a child, but on examining Pelly, he found him so competent to the duties sought for, that he said, "And you shall have it, young gentleman."

administration of the Baroda State. In December, 1876, he was appointed Plenipotentiary for the Frontier discussion on Afghan affairs, and made K.C.B. in the following year. About this period he returned to England, after a most active Indian career, having repeatedly received the thanks of Government for important services.

It fell to the lot of the present writer to be associated with Lieutenant Pelly on his appointment to Sind in 1853, when Mr. (the late Sir Bartle) Frere was Commissioner of that Province, and he was much struck with the exceptional ability and knowledge displayed by the young subaltern, not only in connection with the questions they had to consider together, but in a wide range of subjects, professional or otherwise. The truth of these first impressions was fully confirmed in the course of the next few years; and when a new field of interest had been opened out to him in Persia, Pelly showed, by the way in which he discharged his important duties at the Shah's Court, that, like Malcolm, he could creditably serve his Queen and country in the ranks of diplomacy as well as in those of a native Indian regiment. It may be well briefly to recall the circumstances. The Acting Secretaryship of Legation had been conferred upon him by his relative, Sir Henry Rawlinson, Her Majesty's Minister in Persia, when the whole Legation had been placed under the India Office, and he had ridden from Trebizond to Tehran to take up the post; but in the following year, owing to a change of Government at home, the establishment was re-transferred to the Foreign Office, and Pelly—though promoted, for the nonce, to be *Chargé d'Affaires*—would naturally revert to his former sphere of employment. This latter contingency was made available for his mission to Herat. His work at Tehran completed, he signalised his return to the farther east by an adventurous expedition to the capital of Western Afghanistan; and his journey to India from that city honourably crowned an achievement which could not fail to attract public attention and draw forth public approval. A ride of 800 miles through disturbed regions in the uniform of a British officer, without orderly or any kind of escort, at a time when it was perilous for any European to appear either in the intervening districts or in Afghanistan, may indeed be considered a remarkable feat; and it should be borne in mind that Major Pelly was the first Englishman successfully to effect the transit from the Persian frontier to India, *via* Herat and Kandahar, since the first Afghan war.

In the retrospect of the record of service, another personal reminiscence may not be out of place. At the close of May, 1872, the present writer landed at hot, dreary, and orderless Bushire, preparatory to a march to Tehran. Colonel Pelly, then Political Resident, occupied the large, straggling building which constituted the British Residency in that port; and soon after the steamer had anchored, a kind letter was brought on board, inviting the new comer, and two of the officers with him, to partake of its hospitality. Horses were awaiting the party on the beach, to convey them to their quarters. For nearly three whole days they remained the Resident's guests, and a vivid recollection of the time testifies to two salient features in their host's character: one, his easy but energetic performance of important duties; the other, his unbounded hospitality. He was up to his ears in business, and about to despatch his assistant, under special instructions, to Bahrein, on the opposite shores of the Gulf; two gunboats had just been placed at his disposal for a particular purpose; but nothing affected his attention to his guests, whose comforts were studied in the minutest points, and as many as six sat together at the festive board. In these days, there was the same tendency in his conversation to strike out from the usual Indian grooves, and to throw a flavour of intellect into Bohemianism, that had been remarked some twenty years before. Without doubt,

his prolonged and continuous labours in the Persian Gulf—where he remained for eleven unbroken years—greatly enhanced his reputation; and the subsequent efficient performance of the delicate and difficult duties entrusted to him in Baroda and on the North-West frontier, may be certified by perusal of modern Indian history, in the pages of which the facts are graven. It should not be forgotten that his last return to India was at the special desire of Lord Lytton on his appointment as Viceroy, in order that Pelly might accompany him on his personal staff, to be, in His Excellency's words, his "right-hand man."

In further reference to Sir Lewis Pelly's Oriental career, the following note, written since his lamented decease, is from the pen of a well-known diplomatist of high reputation and large experience. The opinion here recorded is by no means a solitary one, or confined to the relatives or friends of the deceased officer. It is rather the summarised judgment of the public, as expressed in the London and provincial press, more particularly within the last three or four weeks:—

"By far the most remarkable and daring of his many achievements during his forty years of Indian service, was his journey, in 1865, to *Riyādh*, the Wahābi capital in the centre of Arabia. At that date the Wahābis, the fanatical Puritans of Muhammadanism, were the terror of Arabia, and their lieutenants, at the head of small but daring armed forces, controlled the policy of the smaller Arab States bordering the waters of the Persian Gulf, which Pelly, as Resident at Bushire, ruled for many years as a Doge of Venice. The spread of Wahābi power was a political danger, and had to be closely watched. Palgrave, alone among Europeans, and disguised as a Muhammadan, had penetrated Central Arabia, incurring imminent dangers, and it was a current belief that none but a Mussulman could visit *Riyādh* and return alive. This was a state of belief that Pelly would not suffer to exist within the limits of his administration. It was, moreover, highly necessary to establish relations with a Power claiming to interfere directly with the Arab populations along the shores of the Persian Gulf and its islands, and encouraging piracy to the injury of trade. With this object in view, Pelly (in the uniform of a British officer), with two officers, an interpreter, and domestic attendants, started on his long desert march on the 18th February, 1865. He arrived at *Riyādh* on the 5th March, and made the acquaintance of the blind Saiyid Amir, and after several interviews, only made good his return from the stronghold of the chief, by strategy and boldness combined, before the end of the month. On leaving the capital, they found that their water-skins had been poisoned, and, though enduring agonies of thirst, they could only pour the contents over their wrists as a slight refreshment. The romantic daring of this expedition has not often been exceeded."

Of his writings or edited works, may be noticed: I. A pamphlet on the North-West frontier of India, one of the earliest of his miscellaneous writings. II. Contributions to the 'Journal and Proceedings of the Royal Geographical Society.' III. The 'Views and Opinions of General John Jacob, C.B.,' compiled and edited in the form of an octavo. IV. The 'Miracle Play of Hasan and Husain,' a set of thirty-seven dramatic scenes, collected, under his instructions, by a Persian 'teacher and prompter of actors,' and 'written out and corrected in English' by two assistants at the Bushire Residency. V. Letters or articles contributed to newspapers and periodicals. Glancing at these in the above order, we find:—

I. This publication is indicative of his early tendency to grasp at political problems and suggest solutions. It need not be said that there was a political as well as military aspect of the Frontier question.

II. Though a Fellow of the Royal Geographical Society since 1875 only, Pelly had given his first instalment to its publications long before that date, for his paper

on 'The Geographical Capabilities of the Persian Gulf as an Area of Trade,' was read at a meeting on November 23rd, 1863; while in June of the following year, a second paper from his pen was read, describing 'A Visit to the Port of Lingah, the Island of Kishm, and the Port of Bunder Abbas,' interesting in its account of the salt caves and asphalt springs in Kishm, the sulphur mines at Khamfr, and the ruins at Hormuz. Vol. XXXV. of the Society's 'Journal,' for the year 1865, was enriched by his 'Visit to the Wálabi Capital in Central Arabia,' to determine the position of Riyádh, as also a description of the island of Mahi, Seychelles. The former has already been referred to: the latter was practical, clear, and exhaustive, albeit necessarily limited in scope. Sir Lewis was a member of the Society's Council for the years 1870, '80, and '81, and has invariably shown an interest in its work. He was an impromptu speaker at the Geographical Section of the British Association in Birmingham, in September, 1886.

III. An ardent admirer of General John Jacob, it could not be other than a labour of love to Pelly to put together the more remarkable of that officer's written or spoken conclusions on the more important questions of the day, mainly relating to India and Indian Government. But the volume thus edited was made readable and noteworthy by good literary method as well as the currency which it gave to particular principles.

IV. As regards the 'Miracle Play,' it may suffice to quote the last few lines of a review of the book, taking up nearly three full columns of the 'Times,' on August 19th, 1879:—"Looked at below the surface, the Passion play of Haasan and Husain is full of matter of the greatest value to the student of comparative theology, while even the most extravagant incident, anecdote, or invocation which it contains may perpetuate some legend or dogma of an ancient Eastern Pagan faith. Sir Lewis Pelly and his collaborators have deserved the thanks of the public for most interesting work thoroughly well done."

V. Subsequent to the publication of the pamphlet on the North-West frontier of India, or in March and April, 1858, under the initials "C. D. L.," Pelly addressed five letters on Indian reorganisation to the editor of the London 'Daily News.' These are very characteristic of his tone of thought and style, and it may be presumed that they attracted the notice of politicians, because many of the changes which were afterwards effected in the administrative system of India and constitution of the Indian Army, were in accordance with the general principles which he thus advocated. These principles, it may be argued, were substantially those of General Jacob; but the mode in which they were rendered intelligible and attractive to the readers of English newspapers, by new argument and new phraseology, is to be credited to their exponent, "C. D. L."

That Lewis Pelly had strong and marked literary tastes must be evident to all who have perused his despatches and published papers. But there can be little question that the conventional requirements of the 'Blue Book' and public correspondence, belong to a school quite unsuited to the aspirant to literary fame; and it may almost be laid down as an axiom that the more thorough grows the power of inditing official reports, the weaker and less capable of development becomes the writer's imaginative or dramatic instinct, supposing him to have possessed a temperament naturally favourable to its cultivation. Ten or twelve years' residence in Europe, and a discontinuance of the demands for official reports, might have caused him to revert to the pen with a fair prospect of literary success, had it not been that his energies found vent in a parliamentary vocation. His paper in the 'Fortnightly Review' for the past month, entitled "Glimpses of Carlyle," besides having a special interest as the latest evidence of his idiosyncrasies, bears perhaps the most finished literary touch of the writer's previous compositions. It might, indeed,

have been penned by the most accomplished of our prose authors of the day without detriment to reputation. The proofs of this article were corrected a day and a half before he died, at Falmouth.

Something should be said of those years passed in Europe, involving new duties and occupations which honourably closed a life of general activity and usefulness. Sir Lewis Pelly's home career may be held to have been happily inaugurated by his marriage, on the 1st of August, 1878, with Miss Amy Lowder—step-daughter of our esteemed Vice-President and former President, Sir Rutherford Alcock—a lady for whom all her friends and acquaintances must feel the most sincere and respectful sympathy at this period of bereavement. The wedding took place in Westminster Abbey, and the late Dean Stanley officiated on the occasion.

In 1883 Pelly was asked by H.M. the King of the Belgians to proceed to the Congo, and take over the administration of that State. He declined, not liking to risk his wife's health by exposure to the West African climate. In November, 1885, he stood successfully—in the Conservative interest—for the Northern division of Hackney, and sat for that borough ever since, up to the date of his decease. Though not often heard as a speaker, and confining his share in debate chiefly to Imperial questions, he bore a high character in the House, and was listened to with attention. He first suggested the great need of protecting our coaling stations abroad, and of spending twenty millions in increasing and strengthening our navy. Among his constituents he was regarded as a distinguished servant of the State, quite irrespective of party considerations. It will be remembered that he had to undergo two contests for his seat, in the first of which (1885) he scored a majority of 416, obtaining, in the following year, owing to Liberal abstentions, one of 1503. His last public utterance was at Hampstead, on the 6th of April, when he spoke to a large gathering at the Constitutional Club on the "British Empire and its responsibilities." The address was spirited, eloquent, and instructive, and the allusion in it to our position in East Africa was doubly significant from the speaker's personal knowledge of the subject. Himself one of the first directors of the Imperial British East Africa Company, associated with the high-minded Sir Bartle Frere in his mission to Zanzibar, and once exercising Consular jurisdiction on the East African coast, he was standing far outside the limits of platform platitudes, when he said: "The African question is upon us, just as certainly as towards the close of the last century the Indian question loomed upon our forefathers."

Appropriate extracts wherewith to conclude the present necessarily brief notice might readily be found in the many tributes to Sir Lewis Pelly's memory contained in the better known London papers. But let us confine our attention rather to the Hackney local press of the 30th April last, on which date the columns of the 'Mercury' contained the details of the funeral, the memorial service, and meetings held to pass votes of condolence, or otherwise take cognizance of the serious loss sustained by the borough in the person of the deceased member. One of the speakers at the Stoke Newington Vestry remarked, with feeling and discrimination, to his hearers:—"To many of them the late Sir Lewis Pelly was known personally, and those would well say, with himself, they never met a more courteous, more able, more upright, or more honourable gentleman. He served his constituency well; he served his country well; and his sudden death would be a loss not only to North Hackney, but to the country at large."

At the meeting of the Council of the Society on May 9th, the President was requested to address, on behalf of the Council, a letter of condolence to Lady Pelly. The following is a copy of the President's letter:—

"1, SAVILE ROW,

"BURLINGTON GARDENS, W.,

"13th May, 1892.

"DEAR LADY PELLY,—

"I am requested by the Council of our Society to convey to you the expression of its sympathy in the heavy affliction which has fallen upon you. The public services of your distinguished husband in India, Arabia, Persia, and East Africa are well known, but we are more especially bound to remember with gratitude that amidst all his trying duties he found time to make important contributions to geographical knowledge. After his return to Europe, Sir Lewis for several years gave his aid to the Council, much to the advantage of it and of the Society. The House of Commons has lost in him a valuable member, Geography a true friend, and the country a most faithful public servant.

"I am,

"Dear Lady Pelly,

"Sincerely yours,

"M. E. GRANT DUFF."

REPORT OF THE EVENING MEETINGS, SESSION 1891-92.

Tenth Meeting, 9th May, 1892.—The Right Hon. Sir M. E. GRANT DUFF, G.C.S.I., President, in the Chair.

ELECTIONS.—*Keith Francis Geo. Anstruther, Esq.; F. M. Darwick, Esq.; J. T. Mc.L. Boyle, Esq.; William Jesse Brown, Esq.; William Duff Bruce, Esq.; George Andrew Craig, Esq.; John Dalziel Fairley, Esq.; Albert Gray, Esq.; Frederick Leonard Jonsson, Esq.; William Grant MacGregor, Esq.; Frederick C. Stevenson, Esq.; Lieut.-Colonel Henry Toms.*

The paper read was:—

"*Imèrina, the Central Province of Madagascar.*" By the Rev. James Sibree.

The paper was illustrated by means of the dioptric lantern. There was an exhibition of curios and photographs in the tea-room.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Berlin.—5th March, 1892: Baron von Bichtshofen in the Chair.

THE DRAINAGE OF THE PONTINE MARSHES.

Captain Von Donat read a paper upon the Pontine Marshes and their drainage. These marshes extend in a narrow belt, from 1 to 1½ miles broad, and 5 miles long, from Cisterna at the foot of the Alban Hills to Terracina, at the southern foot of the Volscian Mountains. The marshes cover an area of about 6 square miles, but their poisonous exhalations carry death over another 16 square miles; this large tract of country, unequalled in fertility by any in Europe, and capable of supporting half a million persons, is uninhabitable. In the marshes proper at the present time there are living at most 30 persons, who occupy the isolated post stations along the classic Via Appia, which is shaded by four lines of very ancient elms. These persons, with their yellow-grey skin and their complete lack of energy, present a wretched

appearance, which is in striking contrast to the luxuriance of the soil, the excellence of the situation, and the charming character of the climate. The surface covering of the soil of the marshes proper consists of a very old, soft, close and elastic peat, which shrivels up very considerably when the water is quite drained off. It increases in thickness in the direction of the Volscian Mountains: thus, e.g. beside the Appian Way, it is about 10 feet thick, but at the foot of the mountains it is over 70 feet. This peat mass apparently fills up a former arm of the sea, as Homer speaks of Monte Circeo as an island. Under the peat reposes a stratum of clay about a foot thick, containing a quantity of shells, sea sand, and the remains of plants. The Volscian Mountains exercise an important influence on the Pontine basin. They are composed of limestone, much split up, and having been cleared of timber, they have completely lost their covering of humus, which accounts for the extraordinary variations in the level of the waters of the rivers and brooks which flow down from them. The most important of these streams, the Amaseno, carries down as a rule only 9 cubic metres per second, but after heavy rain showers 80. After these heavy downpours the volume of water precipitated into the Pontine plains is immense, and for months some parts remain under three feet or so of water. The troughs which at ordinary times are full of water, are quite insufficient to carry off the great influx, although in the middle of summer the marshy tract is so far dried up that it can be traversed at all points. If it were not for these tributary streams flowing into it, almost the whole of the Pontine basin would be drained; only about 5000 acres lie so low that the natural fall of the ground is insufficient to carry off the water. Again a series of important springs rise at the foot of the Volscian Mountains which alone contribute one-and-a-half times as much water as might be expected properly to drain from the whole Pontine basin. These springs in their long subterranean courses absorb gases and dissolve mineral substances, which are subsequently deposited in thick strata. In the interior of the marsh basin not a single spring has been found which can be traced to the underlying clay stratum. For this reason a system of drainage such as is used in America, and which consists in piercing the underlying impermeable strata in order to provide an outlet below for the marsh water, would not be applicable to the Pontine marshes. Another circumstance which increases the amount of water in the marshes is that the rivers and drainage channels have only a single outlet into the sea, consequently the waters get dammed up and then overflow the whole plain. The great luxuriance of the water vegetation in the streams helps to block them up. The author, after detailing the various attempts which have been made to drain the marshes, from that of Appius Claudius in B.C. 312, down to those of recent times, proceeded to describe his project for drainage. (1) In order to secure the absolute healthiness of the atmosphere only a radical cure will suffice; no portion of marshy ground must be allowed to remain, otherwise the colonists would be exposed to danger from the "aria cattiva." (2) In contrast to the earlier schemes, no streams must be any longer allowed to come into the marshes. All tributaries from the hills, all springs, must be caught by peripheral canals, which would be shut off from the inner ditches, and carried direct into the sea. In the west there is already a canal of this kind in existence in the Fiume Sisto. It is only necessary to give it a direct outlet into the sea by means of a cross section 600 yards in length. The fall of 1:500 is quite sufficient to keep this opening permanently free. (3) It would be necessary to regulate the flow of the flood water from the mountains so as to spread it over about four days. This could be done (a) by fostering a vegetation, although first of all slight, on the poor rocky soil, (b) by placing a large number of small funnels in the upper mountain regions, (c) by erecting barriers in villages where the channel is wide, so as to narrow the

outlet. If by these means no foreign water were allowed to reach the marshes, the present interior channels would be sufficient to drain the now inundated land in a few weeks. (4) The 5000 acres which lie too low for natural drainage, must be shut off from the rest of the marshy region by small dams, and the water pumped out. The advantage of the scheme propounded above lies in the fact that it would be a continuation of the works of Pius VI., and would utilise the latter, and also that the real works on the soil would be necessary only on the edge of the marshes, along by the sea and by the hills, not in the low-lying beds of moss, thus giving better security of life and health to the workmen. If the drainage were commenced simultaneously at all points on a uniform plan with energy, and an adequate number of men and the necessary plant, it could be completed in a single winter, and the drainage works proper would cost considerably less than a million lire.—Dr. Credner, of Leipzig, then gave a description of the Colorado plateau, and of the great cañon of the Colorado river.

Geographical Society of Paris.—April 1st, 1892: M. CHEYSSON in the Chair.—M. Martel forwarded a note upon the contamination of springs in chalk soils. A communication was read from M. Charles Rabot, on explorations in Northern Russia by Finlanders. In a short note M. D. Bellet discussed the growth of population in Canada as shown by the census of 1891. An interesting letter was read from Dr. Ten Kate on his voyages in the East Indies.

THE ROUTE FROM EL GOLEA TO GERVILLE.

M. Léon Teisserenc de Bort, in presenting a hypsometrical map of the Sahara, gave some information as to the route from El Golea to Gerville, which he was the first to survey by astronomical determinations in 1868. This route is particularly poor in wells; for a distance of 140 miles there is no water. The valley of the *Wed Segguur* ceases to be visible after leaving *Dayet-Amara*. Between this point and El Golea, for a distance of 70 miles, the soil is covered with dunes, which border the great depressions of the soil. At the bottom of these depressions abundant deposits of clay are found. But the whole country is covered with hollows of this description, so that there is no valley of the *Wed Segguur* apparent as indicated on existing maps. In fact, this dune region forms a kind of low bottom, where the waters flowing down from the southern slope of the *Jebel Amur* collect. These waters, after having filtered through the soil, are found at El Golea, where they are at a small depth. M. de Bort pointed out that the project for connecting El Golea with Oran, in the south, would isolate El Golea from French influence, because of the difficulty of communications with *Brezina* and Gerville. The present arrangement which makes El Golea dependent upon the *Mzab* is much preferable.

Lieutenant E. Vodel read a paper upon the *Polynesiens*, among whom he has lived for seven years.

—April 22nd, 1892: M. CHEYSSON in the Chair.—M. Georges Rolland, mining engineer, forwarded to the Society his last communication to the Academy of Sciences on the régime of artesian waters of the region of El Golea. M. Martel gave a summary of the results of the two subterranean excursions just made by him in the *Côte d'Or* and in the *Charente*, from which it appears that there are no large caverns under the *Braconne*, between the *Bandiat* and the *Touvre*, such as were supposed to exist.

M. Emile Müller, Professor at the Russian Imperial Lyceum of Tashkend, communicated some particulars as to the production of mercury and platinum in Russia.

Communications were read from M. E. Müller on the lepers of Bokhara, from Père Bauron on Tunisia, and from M. D. Bellet on the urban population of Canada.

Dr. Meyners d'Estrey forwarded some particulars as to the tribes of the districts of Kedah and Serak (Malay peninsula). The Semang and Sakai claim to be the aborigines of the Malacca peninsula.

M. de Villemereuil gave an account of the attempts which had been and were being made to test the navigability of the Khon rapids, which form the great barrier to the navigation of the Mekong. In conclusion, a paper was read by M. Ch. Lallemand, on the means of ascertaining the level of the ocean.

NEW GEOGRAPHICAL PUBLICATIONS.

(By HUGH ROBERT MILL, D.Sc., *Librarian, R.G.S.*)

EUROPE.

Ward, C. S., & Baddeley, M. J. B.—Thorough Guide Series. South Devon [including West Dorset coast] and South Cornwall, with a full description of Dartmoor and the Scilly Isles. 18 Maps and Plans, by Bartholomew. Fourth edition. London, Dulau & Co., 1892: 12mo, pp. xvi. and 225. Price 4s. [Presented by the Publishers.]

The present edition appears to have been carefully revised, several of the routes having to a large extent been rewritten, while various additions and corrections have been made to others. A new plan and map have been added to this edition.

ASIA.

Benko, [Freiherr von] Jerolim.—Die Schiff-Station der k. und k. Kriegsmarine in Ost-Asien. Reisen S.M. Schiffe 'Nautilus' und 'Aurora,' 1884-1888. Wien: Carl Gerold's Sohn, 1892: 8vo, pp. 990. Three Maps. [Presented by the Publishers.]

An official account of the east coast of Asia, derived from the reports of two Austro-Hungarian expeditions sent out for the purposes of promoting the commerce of the monarchy with the far east. Part A. gives the cruise of the 'Nautilus' from Smyrna to Petropavlovski, touching at most of the commercial harbours of the Malay Archipelago, China, and Japan, with numerous tables of distances, anchorages, meteorological observations, &c. Part B. is a similar record of the cruise of the 'Aurora' from Pola to Nagasaki, but without detailed statistics. Parts C. and D., which constitute the greater part of the volume, give accounts of Siam, China, and Japan, and of the various European possessions in the east derived from various sources. These deal specially with the economic conditions and natural resources of the countries and seaports.

De Windt, Harry.—Siberia As It Is. London, Chapman and Hall, 1892: 8vo, pp. 504. Illustrations. [Presented by the Publishers.]

Mr. De Windt states that in the interests of truth he has made his "account of the prisons of Russia and Western Siberia as plain and matter-of-fact as possible without any attempt at colouring or romance." During a former journey through Siberia, in 1887, he formed a favourable opinion of its prison arrangements; but in order to make a more careful inspection he undertook the present journey during the summer and autumn of 1890. Mr. De Windt travelled from Perm to Tumen (500 miles) by rail—a line quite famous for its luxurious appointments. This railway, it appears, is the private property of a firm of Siberian millionaires; it is a single line of easy gradients, its highest elevation being 1300 feet above the level of Perm. On account of exceptionally low water Mr. De Windt had to drive 80 miles to Yevlevoi, whence a steamer carried him 1800 miles, first on the Irtysh and then on the Ob to Tomsk, which was the eastern limit of his journey.

There is little that is purely geographical in the volume, though the author has devoted some space to characteristics of social life, and of the native races. The general impression produced on him by the scenery of Siberia seems to have been one of monotony and cheerlessness.

Much of the book is taken up with attempting to controvert Mr. Kennan's statements and conclusions. There is a vigorous Introduction by Madame Novikoff; but what the book requires more urgently than any Introduction is a map, and this want is not supplied in any shape or form.

Hake, A. Egmont.—Events in the Taeping Rebellion, being reprints of MSS. copied by General Gordon, C.B., in his own handwriting. With Monograph, portrait, and plate, Introduction, and Notes. London, W. H. Allen & Co., 1891: 8vo, pp. 531, 1map. Price 18s. [Presented by the Publishers.]

This volume opens with a slight sketch of the career of Gordon, followed by an account of the relations of China with foreign powers during the Taeping Rebellion. In accordance with its title the bulk of the work deals with events connected with the Taeping Rebellion, concluding with "Reminiscences" of Gordon, by one who served with him in China. There is neither an index nor table of contents.

[**India.**]—Account of the Operations of the Great Trigonometrical Survey of India, vol. xiv. General Description of the Principal Triangulation of the South-West Quadrilateral, including the Simultaneous Reduction and the Details of its Component Series. Prepared under the directions of W. H. Cole, Esq., M.A. Published under the orders of Colonel H. R. Thwaites, R.E., Surveyor-General of India. Dehra Dun, 1890: 4to, charts and plates.

[——].—Synopsis of the Results of the Operations of the Great Trigonometrical Survey of India, vol. xxii. Preliminary Issue. Descriptions and Co-ordinates of the Secondary Stations and other fixed points of the Assam Valley Triangulation, E. of meridian 92°, emanating from the Assam Longitudinal Series (or Series X. of the N.-E. Quadrilateral). Dehra Dun, 1891: 4to, maps.

[——].—Ditto. Vol. xxiii. Descriptions and Co-ordinates of the Principal and Secondary Stations, and other fixed points of the South Konkan Coast Series, or Series C. of the Southern Trigon. Dehra Dun, 1891: 4to, chart and diagram.

[——].—Ditto. Vol. xxiv. Descriptions and Co-ordinates, &c., of the Mangalore Meridional Series, or Series D. of the Southern Trigon. Dehra Dun, 1891: 4to, charts and diagrams.

Pratt, A. E.—To the Snows of Tibet through China. London, Longmans, Green, & Co., 1892: 8vo, pp. 268. With illustrations and map. [Presented by the Publishers.]

Mr. Pratt's singularly successful collecting expeditions in the west of Sze-chuan have enriched several departments of natural history, and the lists of species collected (although much of the material is not yet worked up) fill three appendices. The body of the book is a simple and straightforward narrative of the author's travels and experiences, which, although rarely mentioning the name of adventures, were often exciting, and generally uncomfortable. Although seriously hampered by the "credulous and cowardly" Chinese officials, and by the populace of the towns passed through, Mr. Pratt was able to avail himself, to a very large extent, of the services of native collectors. He acknowledges much kindness from the French Roman Catholic missionaries of the remote borderland of Tibet, some of whom have spent thirty years in isolation from civilized companionship. The descriptions of the navigation of the Yang-tze-kiang, and of the floods to which that river and its upper tributaries are subject, show the serious difficulties which steamers would encounter above I-chang should that section of the river be opened to them.

Price, Julius M.—From the Arctic Ocean to the Yellow Sea. London, Sampson Low, Marston, & Co., 1892: 8vo, pp. 380, illustrations and map. [Presented by the Author.]

Mr. Price made his journey in the summer of 1891 as special artist of the 'Illustrated London News.' His route was novel and interesting, crossing Asia from north to south-east. As far as Yeneseisk he journeyed by water, accompanying a trading expedition, which repeated Captain Wiggins's famous voyage through the Kara Sea. From Yeneseisk to Urga he travelled in sledge or tarantass, and by various means of carriage ultimately reached Peking and Shanghai. Mr. Price's book is a record of his impressions, and contains vivid descriptions of the ice-blocked Kara Sea, the dreary basin of the Yenesei, the frozen Lake Baikal, and the desert scenery of Mongolia. Mr. Price visited several prisons on his way through Siberia, and formed a very favourable opinion of the freedom the prisoners enjoy, and the humanity with which they are generally treated. As might be expected, the illustrations are admirable, and the map also is good.

AFRICA.

Greswell, [Rev.] William Parr.—Geography of Africa south of the Zambezi, with notes on the Industries, Wealth, and Social Progress of the States and Peoples. Oxford, the Clarendon Press, 1892: 8vo, pp. xii. and 400; with three maps. Price 7s. 6d. [Presented by the Publishers.]

Fourteen chapters are occupied with the geography of South Africa, and thirty-two appendices follow, giving special information and statistics on many related matters. Being published under the auspices of the Royal Colonial Institute, the book has an authoritative character, and the author's personal knowledge of the region adds greatly to the force and picturesqueness of the descriptions of scenery. The political history rather than the historical geography of Cape Colony occupies considerable space; but the physical geography of the region is treated particularly well. The book should prove useful as a volume of reference to all connected with South Africa. Singularities in the spelling of place-names may at first puzzle the reader, but reference to the serviceable maps should prevent any real misunderstanding.

Schnell, [Dr.] Paul.—Das Marokkanische Atlasgebirge. Gotha, 1892: 4to, pp. 119, map. (Ergänzungsheft, No. 103, zu Petermann's 'Mittheilungen'.)

This is an excellent monograph relating to a little-known part of Africa. The 'General Part' comprises the first 25 pages, and is a review of the orography and geology of the Morocco highlands, which enables Dr. Schnell to establish a definite nomenclature of the various chains of the Atlas system. He sharply separates, first, the highlands of North-west Africa from the plateaus of Interior Africa. The former belong to the circum-Mediterranean orographical systems, and are characterised by their numerous parallel ridges and full geological development. The great depression of the Wad Dra in the west, and the Wad Joddi and the Shottis in the east, separates the two. As to the highlands of North-west Africa, they may be divided into three separate parts:—1. The Morocco highlands, almost exclusively palaeozoic and mesozoic, which began to be elevated at the end of the secondary period; 2. The Algerian and Tunisian limestone highlands, mesozoic and kainozoic, which were elevated chiefly during the Tertiary period, and subjected to great erosion in the Quaternary; and 3, the remainder of the old littoral ridge, which consists of archæan formations covered with palaeozoic and tertiary deposits.

In the author's view the Morocco highlands consist of three ridges running from south-west to north-east, composed of one medial chain, and two secondary ridges, separated from the former by deep valleys, but partly connected with it by massive upheavals. The chief ridge is the High Atlas, which begins at Cape Gir, and after having bent a little towards the south at 5° W., continues in an east-north-eastern direction, and reaches the northern shore of the Shott Tigrî (33° N. lat., 2° W. long.). It rises to 10,000 and 12,000 feet, and sharply divides the whole country into two widely different regions. The

passes across it attain 11,800 feet south of the capital of Morocco, from 7000 to 8000 feet further east, and only 4000 feet in its lowest western part. The name of Anti-Atlas is reserved for the southern parallel chain. It also has a length of nearly 600 miles, Dr. Schnell tracing it as far east as the plateau in the North of the Kenadsa oasis. The seven passes across it which have been explored attain an average height of 6600 feet—the summits of the mountains rising but little above the passes. The Jebel Rami ridge, situated further south, and connected about its middle with the Anti-Atlas, is the most southern ridge of the system. Its southern slope faces the low valley of the Wad Dra.

The name of Middle Atlas is given to the chain which runs north of the High Atlas, from $31^{\circ} 50'$ N. lat. and $6^{\circ} 50'$ W. long. It stretches in the same north-eastern direction to the place where the Wad Muluya issues from the highlands. Its highest summits attain about 10,000 feet, and its northern slope has three wide terraces, at the base of which are found the valleys of the Wad Inawen and the Wad Maun (1270 to 2200 feet high) which separate the Atlas proper from the littoral ridges. The corner between the Middle Atlas and the High Atlas (which trends towards east-north-east to the east of Jebel Ajashio) is occupied by the plateau of the Upper Muluya. The plateau of the Shotts has a much more complicated structure, not fully explained by recent exploration. Finally, the littoral ridges, or Sahel, consist of separate chains, 1300 to 6500 feet high, and belong to the Iberian mountain system.

The 'Special Part,' gives detailed descriptions of the four separate chains, the longitudinal valley between the High Atlas and the Anti-Atlas, and the high valleys situated between the former and the ocean. The book is illustrated by a map on the scale of 1 to 1,750,000, and a cartoon (1:1,000,000) of the region surrounding the capital of Morocco. —[P.K.]

AMERICA.

America, United States.—Annual Report of the Chief of Engineers, United States Army, to the Secretary of War, for the year 1891. Six Parts. Washington, Government Printing Office, 1891: 8vo, maps. [Presented by the Chief of Engineers, U. S. Army.]

Among the more important papers in this report may be mentioned those dealing with the fortifications of Niagara, river and harbour improvements, and lake harbours. The appendices contain, among other matter, the valuable reports of the Mississippi, and of the Missouri River Commissions.

Brinton, [Dr.] Daniel G.—Studies in South American Native Languages. From MSS. and rare printed sources. Philadelphia, 1892. [Presented by the Author.]

This volume is a reprint from the 'Proceedings of the American Philosophical Society.' The author, eminent as an authority on this little-known subject, is confident that the only possible ethnographic classification of the native peoples of America is by language. The first sixty-seven pages describe and give short vocabularies of the Tucana, Jivaro, Cholona, Leca, Manao, and Bonari languages, spoken by present or former dwellers in the upper Amazon basin; and also the Hengote and Patagonian dialects, and the Kechua language, concluding with a comparison of South and North American languages, and of the dialects of the Betoayas and Tucanos. A short paper of twenty pages is added on the Chumattec language of Mexico and the Mazatec language.

Child, Theodore.—The Spanish-American Republics. London, J. R. Osgood & Co., 1892: 4to, pp. xii. and 444, illustrations.

This volume contains a narrative of observation and travel in the more accessible parts of the five republics of Spanish South America—Chile, Peru, the Argentine, Paraguay, and Uruguay. In the preface we are told that the author's object was not to explore unknown territory, but rather to examine the actual state of the town and country populations in the year 1890; to study the commercial and social life of the capitals and ports; to see how people live and labour in the rural districts; to give an account of the various special

industries; to describe the real aspect of the countries in question; to note the characteristic features of the inhabitants; and, in short, to make a modern report of the progress of civilisation south of the equator. In accordance with this design, the volume is largely descriptive of the people in their various phases of life. The author has, nevertheless, much to say with regard to the geography of the regions traversed. Among the more important chapters are those descriptive of the journey from Buenos Ayres to Mendoza, and from thence across the Andes into Chile, the Nitrate Desert of Tarapacá, Smyth's Channel, and the Strait of Magellan, that describing the trip up the Paraná and Paraguay rivers, and the last two dealing with Paraguay and Uruguay. The illustrations, of which there is an ample supply, are an important feature.

Hervey, Maurice H.—*Dark Days in Chile; An account of the Revolution of 1891.* London, Edward Arnold, 1891-92: 8vo, pp. 331. Price 16s. [Presented by the Publishers.]

Mr. Hervey visited Chile during the height of the civil war as special correspondent of the 'Times.' His observations of men and things led him to sympathise with Balmaceda and the Government; his natural pluck impelled him to a daring cruise in the torpedo-catcher 'Condell,' and the mandate of his paper recalled him to England at the critical moment of the struggle. All this he recounts in an eminently readable way. Apart from its serious purpose of stating the case for Balmaceda, and its pleasant framework of personal adventure, the book has distinct geographical interest. The appendices dealing with the Trans-Andine railway, and with Chilean characteristics and customs, are valuable.

Shaler, N. S.—*Nature and Man in America.* London, Smith, Elder, & Co. 1892: 8vo, pp. xiv. and 280. [Presented by the Publishers.]

The first four chapters of this book are devoted to a summary of the physical evolution of the continents, and to the general relation of their flora and fauna to the physical conditions. Man in relation to his environment is the subject of Chapter V., and the last three chapters deal specially with North America, and mankind on that continent. Several of the chapters have appeared in 'Scribner's Magazine' for 1890; and these, although abounding in the raw material of controversy, are very carefully prepared and of high geographical value. The early chapters are more roughly put together, and form a laborious introduction to the subject proper.

Professor Shaler considers that neither the European nor the Negro race has undergone material modification since their transplantation to temperate North America; but he points out that this is largely due to their ready adaptation to existing conditions, and that such adaptability is only shown within certain limits of environment. He strongly urges the essential interdependence of land and people, and sums up the whole position in the generalisation: "Thus our continents and seas cannot be considered as physical accidents, in which and on which organic beings have found an ever perilous resting-place, but as great engines operating in a determined way to secure the advance of life."

GENERAL.

Bartholomew, J. G.—*The Pocket Gazetteer of the World. A Dictionary of General Geography.* New Census Edition, 1892. London, J. Walker & Co., pp. xxx. and 630, maps. Price 2s 6d. [Presented by the Publishers.]

The present edition of this convenient 'Pocket Gazetteer' has been considerably improved in detail. Its special feature is the addition of a supplement, giving a summary of the recent census returns at home and abroad.

Leguat, François.—*The Voyage of François Leguat of Bresse to Rodriguez, Mauritius, Java, and the Cape of Good Hope. Transcribed from the First English Edition. Edited and annotated by Captain Pasfield Oliver.* 2 vols. [Hakluyt Society Publications, Nos. LXXXII. and LXXXIII.] London, 1891: 8vo, pp. lxxxviii. and 443; maps and illustrations. [Presented by the Hakluyt Society.]

NEW MAPS.

(By J. COLES, *Map Curator R.G.S.*)

EUROPE.

Andriveau-Goujon, E.—Navigation à vapeur dans le Bassin de la Méditerranée et Chemins de Fer de l'Europe Centrale. Scale 1:890,000, or 12·1 geographical miles to an inch. Publié par E. Andriveau-Goujon. Paris, 1891. Price 5s. 6d. (*Stanford.*)

Athènes et ses Environs.—Plan de la Nouvelle Ville, avec indication détaillée des Ruines, Edifices et Murs de l'Ancienne Ville. Scale 1:12,500, or 5·8 inches to a geographical mile. Nouvelle Edition corrigée. Berlin, 1892. Editeurs: Hoefer & Vohsen (Ancienne Maison Dietrich Reimer). Price 2s. (*Williams & Norgate.*)

Damian, Josef.—Tiefenkarte des Caldonazzo- und des Levico-See's. Von Josef Damian in Trent. Scale 1:25,000, or 2·9 inches to a geographical mile. Petermann's 'Geographische Mittheilungen,' Jahrgang, 1892, Taf. 10. Justus Perthes, Gotha. [Presented by the Publisher.]

Deutschen Reichs.—Karte des —, im Massstabe von 1:500,000 (or 6·8 geographical miles to an inch) unter Redaktion von Dr. C. Vogel, ausgeführt in Justus Perthes' 'Geographischer Anstalt in Gotha.' 27 Blätter (und Titelblatt) in Kupferstich. Erscheint in 14 Lieferungen (jede mit 2 Blättern). Lieferung II.: Section 1, Schleswig. Sektion 22, Strassburg i/ Elsass. Lieferung III.: Sektion 6, Emden. Sektion 18, Frankfurt a/ Main. Lieferung IV.: Sektion 4, Danzig. Sektion 14, Berlin. Justus Perthes, Gotha, 1891. Price 4s. each part. (*Stanford.*)

England and Wales.—Tourist's Map of —. Reduced from the Ordnance Survey, by John Bartholomew, F.R.G.S. Scale 1:633,640, or 8·7 geographical miles to an inch. G. Philip & Son, London and Liverpool. Price 2s. 6d.

This map, which is a reduction from the Ordnance Survey, is drawn on the scale of ten miles to an inch. All main roads suitable for wheel traffic are coloured, and the distances between towns, marked with a red spot, are given in figures. The map is drawn in a remarkably clear style, and is well suited to the purpose for which it is published.

France.—Carte Itinéraire des Voies Navigables de la —, d'après le Guide Officiel de la Navigation Intérieure. 1891. Scale 1:1,500,000, or 20·4 geographical miles to an inch. Baudry et Cie, Paris. Price 6s. (*Dulau.*)

ORDNANCE SURVEY MAPS.

Publications issued since the 15th April, 1892.

1-inch—General Map.—

ENGLAND AND WALES: New series. Sheets 106, 110, 135, 136, 149, 150, 153, 154, 162 (hills shaded), 162, 167, 168, 170, 179, 180, 181, 182, 183, 193, 194, 195, 196, 209, 212, 226, 227, 244, 245, advanced edition, photolithographed, 1s. each.

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ENGLAND AND WALES: Lancashire, XXXV. 10, 13, XXXVIII. 12, 15, XXXIX. 1, 4, 5, 7, 8, 10, 18, 4s. each (coloured). Yorkshire, LXXVI. 3, 4, 7, 8, 12, 14, each. 10, 3s.; XCL 11, 5s.; 13, 19, XCH. 1, 7, XCIII. 1, 4s. each; 6, 5s.; XCV 10, 13, 4s. each; C 3, 8, 11, 3s. each; CI 1, 2, 3, 4, 8, 6, 7, 10, 11, 12, 14, 4s. each; 15, 5s.; 16, CH. 10, CHII. 1, 3, 9, 11, 12, 14, 16, CX. 3, 4s. each; 11, 3s.; 13, CLIX. 2, 4s. each; 3, 5s.; 7, 6s.; CXX. 3, 4, 9, 4s. each; CXLI. 11, CXIV. 1, 5s. each; CLVIII. 1, 2, 4, 6, 10, 12, 14, 4s. each; CLXXI. 2, 5s.; CLXXVIII. 1, 2, 3, 4, 6, 4s. each; 6, 7, 10, each. 2, 5s.; 9, 10, 11, each; 13, 14, CLXXIX. 1, 2, 3, 6, 6, 4s. each. 7, 5s.; 8, 10, 11, 12, 13, 14, 15, 16, CLXXX. 2, CXCVII. 3, 4, 12, 13, CCVI. 16, CCKIX. 2, 8, 4s. each; 6, 6s.; 9, 10, 13, 6s. each;

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(Stanford, Agent.)

AFRICA.

Africa.—Stanford's Library Map of —. New edition, 1892. Scale 1:5,977,382, or 82 geographical miles to an inch. E. Stanford, London. 4 sheets. Price £1 15s.

An inspection of this map shows that great pains has been taken to bring it up to date. All the political divisions are accurately laid down, and use has been made of the most recent information obtained from explorers to correct the physical features. The hill shading, though sufficient to convey a general idea of the topography, is not so pronounced as to produce confusion. The lettering is remarkably clear, the colours are well chosen, and taken as a whole it is an excellent map.

Dahomey.—Carte du — au 1:500,000, or 6·8 geographical miles to an inch. Dressée par M. A. L. d'Albéa, ancien Administrateur colonial à Porto-Novo, publiée par le journal 'La Politique Coloniale.' [Presented by the Editor of 'La Politique Coloniale.']

This map has been compiled from all the most recent data, the authorities for placing positions in latitude and longitude being given at the foot. The routes followed by explorers, and, in some cases, the number of days march between important places, are given, together with useful notes, such as the limits of navigation, the nature of the soil, &c.

AMERICA.

Rand, McNally & Co.—Pocket Maps and Shippers' Guides of Maine (scale 1:1,110,000, or 15·2 geographical miles to an inch). New York (scale 1:820,000, or 11·2 geographical miles to an inch). Pennsylvania (scale 1:770,000, or 10·5 geographical miles to an inch). South Carolina (scale 1:1,190,000, or 16·2 geographical miles to an inch). Price 1s. 2d. each. New Sectional Map of the Cherokee Outlet, Oklahoma (scale 1:310,820, or 4·3 geographical miles to an inch). Price 4s. 4d. Rand, McNally, & Co., Chicago and New York. [Presented by the Publishers, through E. Stanford, Esq.]

AUSTRALASIA.

Australasia.—Stanford's Library Map of —. New edition, 1892. Scale 1:4,089,064, or 56 geographical miles to an inch. E. Stanford, London. 4 sheets. Price £1 15s.

This is a new edition of Stanford's well-known map of Australasia. It has been carefully brought up to date, and is in every respect a thoroughly good map.

New Zealand.—Maps of the North and Middle Islands. Scale 1:951,190, or 13 geographical miles to an inch. Photo-lithographed at the General Survey Office, Wellington, N.Z., 1891. Price of the two maps, 6s. (*Philip & Son.*)

Tasmania.—Map of —. Scale 1:507,550, or 6·9 geographical miles to an inch. Photo-lithographed at the Survey Office, Hobart, Sept. 1891. Price 5s. (*Stanford.*)

CHARTS.

Admiralty.—Charts and plans published by the Hydrographic Department, Admiralty, March and April, 1892.

No.		Inches.	
1616	m =	4·0	Wales, west coast:—Port Madoc. 1s. 6d.
1520	m =	9·5	Mediterranean, Greece:—The Piræus and Phalerum bay. 2s. 6d.
808	m =	1·0	Canada, Lake Huron:—Mildram point to St Joseph island. 2s. 6d.
834	{ m = 1·0 m = 0·75 }		Bay of Bengal, Burma:—Bassein river and approaches. 2s. 6d.
1580	m =	0·45	South Pacific, Solomon islands:—Bauro or San Christoval island. 2s. 6d.
1570	m =	0·25	South Pacific, New Hebrides islands:—Malo island to Efate island. 2s. 6d.
1637	m =	various	South Pacific, New Hebrides islands:—Efate (Sandwich) island, Fila harbour, Metensa bay, Ssakoe harbour. 2s. 6d.
1642	{ m = 1·5 m = 6·0 }		South Pacific, New Hebrides islands:—Havannah harbour. 1s. 6d.

(*J. D. Potter, Agent.*)

CHARTS CANCELLED.

No.		Cancelled by	No.
1484	Sarn-Badrig, Sarn-y-Bweh, Port Madoc	New plan. Port Madoc	1616
1520	The Piræus	New plan. The Piræus and Phalerum bay	1520
834	Bassein river	New plan. Bassein river and approaches	834
836	Port Campbell	Plan transferred to	808
134	Plan of Havannah harbour on this sheet	New plan. Havannah harbour ..	1642

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 1413, England, west coast:—Holyhead bay. 2461, Scotland, west coast:—Sound of Islay. 46, Ireland, north coast:—Larne to Bloody foreland. 77, Spain, north coast:—Gijon bay, &c. 1187, Mediterranean:—Alicante to Palamos, with the Balearic islands. 202, Adriatic sea:—Port Pola and Brioni islands. 1127, Canada:—Montreal harbour. 1338, South America, west coast:—Vallenar road. 40, India, western coast:—Karachi harbour. 70, North Indian ocean:—Bay of Bengal. 898, Bay of Bengal, Andaman islands. 2760, Sumatra, west coast:—Acheh head to Tyingkok bay. 932, Eastern Archipelago:—Harbours and anchorages on the coasts of Java. 934, Eastern archipelago:—Surabaya, Bali, and Sapudi straits, &c. 2725, Gulf of Siam:—Kob Tron, and channels leading to Kamput anchorages. 1602, China, east coast:—Approaches to the Yang-tso-Kiang. 2876, Japan:—Suto-uchi or Inland sea. 2747 a & b, Australia, south

coast:—Port Phillip entrance, 2 sheets. 1171 a, Australia, east coast:—Danger point to cape Morston. 2423, Papua or New Guinea:—Boigu island to cape Blackwood. 134, South Pacific ocean:—Harbours and anchorages in New Hebrides.

(*J. D. Potter, Agent*).

ATLASES.

Johnston, W. & A. K.—Royal Atlas of Modern Geography. Edition in monthly parts. Part VII. W. & A. K. Johnston, Edinburgh and London, 1892. Price 4s. 6d. each part. [Presented by the Publishers.]

This is the seventh issue of the new edition of this atlas. It contains the southern portion of the map of Italy, and a map of Ireland, each of which is accompanied by an index, containing all the names that appear on the map.

Meyers Kleiner Hand-Atlas.—Mit Benutzung des Kartenmaterials aus Meyers Konversations-Lexikon zusammengestellt in 100 Kartenblättern und 8 Textbeilagen. Leipzig und Wien. Verlag des Bibliographischen Instituts, 1892. Price 6d. each part. [Williams & Norgate.]

This is the first issue of a new atlas, which, when complete, will contain one hundred sheets of maps, with accompanying letterpress. This part contains an orographically coloured map of the Alps, a plan of Berlin and its environs, maps of Schleswig-Holstein, Bohemia, and Hungary; the northern half of a map of Italy, and the eastern part of German East Africa. The maps are all well drawn, and if the remaining parts are published in the same style, it will be a remarkably cheap and useful atlas.

Universal Atlas.—The —, complete in 28 parts, including index. London, published by Cassell & Co., Limited, for the Atlas Publishing Co., Limited. Part XIV. Price 1s. each part. [Presented by the Publishers.]

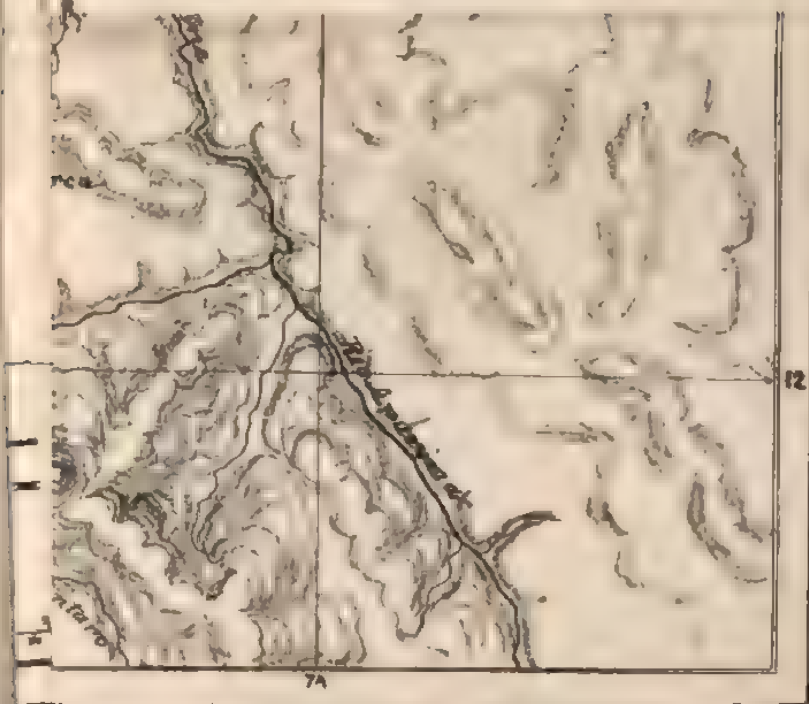
Part XIV. of this atlas contains the following maps:—Ireland, ethnographical map of Europe, with insets of the districts where the Basque and Breton languages are spoken, and two others, on which the boundaries of languages in South Tyrol, and the limits of the Flemish language in Belgium, are shown. The two remaining sheets are occupied by a map of the Austrian Alps.

PHOTOGRAPHS.

Mexico, New Mexico, and Utah.—A Series of Photographs of —. [Presented by Arthur W. W. Brown, Esq.]

The photographs of Mexico contain views of Popocatepetl, Iztaccihualt, Zacatecas, ruins of Mitla, and Xochimilco, sculptures in the museum of Mexico city, etc. Among the photographs of New Mexico and Utah are some of Indian villages, or community houses, near Santa Fé, and views of rock scenery and cliff dwellings in South-east Utah. It is thought by Mr. Brown that these latter, which must not be confused with those in the Mancos Valley and its vicinity, have not been previously photographed.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given. In response to this notice many valuable photographs have been presented; the collection, however, is at present far from being complete, one of its greatest deficiencies being the entire absence of any photographs of Asia Minor.





PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Sierra Leone and the Interior, to the Upper Waters of the Niger.

By G. H. GARRETT, Esq., Travelling Commissioner for the
Colonial Office.

(Read at the Evening Meeting, March 11th, 1892.)

Map, p. 512.

THE approach to Sierra Leone from the sea in the daytime is extremely beautiful. On the right hand is the low lying Capo with its lighthouse, backed with dense foliage. And from this point to the anchorage of Freetown, four miles up the estuary, there is a succession of charming bays and creeks, their shores covered with dense foliage from the water's edge up to the hills, which rise at the back to a height of 1800 feet; and beyond them towers the Sugarloaf (so called from its shape), attaining to upwards of 2500 feet above the sea-level. The streets of Freetown are well planned, but the town itself is badly situated at the foot of the hills, which protect it from the pure south-westerly sea-breeze. The winds generally appear to eddy over the town, and to this the unhealthiness of Freetown is in some measure due.

The colony of Sierra Leone extends from the Great Skarcies river on the north, to the Mano river on the south, with a coast line of about 200 miles. Its rivers are the Great Skarcies, or Kolentang, with its affluents the Mahole and the Monko rivers, the Rokelle river (the estuary of which is the misnamed Sierra Leone river), the Katus or Ribbi river, the Bumps, the Kaghboro, misnamed Cockboro river, the Yaltucker, the Bagru, the Jong river, called in its upper part the Bampampana and Tia, the Bum and Kittam rivers, the Gallinas, the Sulima, and the Mano river, the latter forming the boundary between the colony and Liberia. The principal rivers are navigable for a distance of from 40 to 50 miles from the coast, where the first falls are met; above this there are rapids in places, but no serious obstacle to navigation in the principal rivers for some days' journey.

At an average distance of 80 to 100 miles from the coast the
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mountains rise abruptly. The intervening alluvial plain is undulating, and composed, on the more elevated portions, of laterite; the valleys consisting of a mixture of clay and sand. Much of this land is under water during the rains. Commencing on the coast line, the vegetation consists of a dense impenetrable bush, with numerous palm and other tall trees; this gradually gives way to large plains, covered with a cane grass 10 to 12 feet in height, with a few trees (mostly the *Lophira alata*) in the higher portions. Nearing the mountains, the soil becomes darker and much richer, and here rice is prolific and the kola tree abounds.

To the south of Freetown is Sherbro Island. The delta of the Jong, Bum Kittam, and Bagru rivers forms what is called the Sherbro river, and separates the island from the mainland. This delta is one vast mangroveswamp; foetid mud spits, submerged at every tide, are covered with mangrove trees, and form numerous islands, the home of the crocodile and water-fowl. Bonthe, the principal town and seat of government of the district, is situated at the east end of the island, and is about 100 miles from Freetown. The island itself is low lying, and intersected by numerous creeks, the so-called Black River dividing it in two. Except on its seaboard, where it is fringed with mud banks covered with mangrove, the interior consists of undulating sand ridges lying parallel to the sea beach, the hollows of which are full of water.

General Turner's Peninsula, separated from the mainland by the Bum Kittam river, has the same formation. The Kombura (a lagoon lying between the Gallinas and Sulima rivers) was a few years ago only protected from the open sea by broken sandbanks, and when the wind blew in freshly the passage was dangerous. To-day it is perfectly smooth, being separated from the ocean by a wide belt of sand. Sherbro Island, Turner's Peninsula, and the land for some distance inland along the sea-board as far as the Mano river, have been thrown up at a very recent geological date by the action of the surf. The Gallinas river at times forces its way across the belt of sand, but as the rains cease, its current is diminished and the surf again throws up the sand, and blocks up the opening, the river water going along the lagoon and out to the ocean through the Sulima bar. The Kittam and the Bum rivers appear to have been thrown back in a similar way, and after flowing parallel to the sea for nearly 50 miles, and separated from it in places by only 400 or 500 yards of sand, eventually find an outlet through the Sue Bar entrance. Kase Lake, 50 miles up the Bum Kittam river, is a fine sheet of water, about eight miles long by $1\frac{1}{2}$ broad. Its shores are much indented, and there are numerous islands in it, all clothed with vegetation. The bottom is sandy, and the water clear and bright—a lovely spot as regards scenery.

The inhabitants of the Gbeimua and Soro countries, particularly the former, are a fine race, the women being especially noted for their beauty. They appear to be a mixture of Gallinas and Mendis, with

a dash of European blood, acquired presumably from the old Portuguese slavers. The Gallinas are closely allied to the Mandingos, whence they appear to have come. The Krims are a fine race, but inferior in physique; they speak Mendi.

On Turner's Peninsula, and Sherbro Island, Sherbro is spoken; this is most difficult of acquisition by even the surrounding tribes, and, from all I can learn, is a distinct language. The Sherbros are a much lower type; they are savage and morose in disposition, wear little clothing, and are very superstitious; many of them are cannibals. At the back of these is the Mendi-speaking nation; a wild savage people, inferior in physique to the Gallinas, yet a sturdy warlike race. They supply the fighting men in all the wars in the surrounding country, hiring themselves out for a little cloth, tobacco, or rum, and relying for recompense upon plunder. They would appear to fight for the love of fighting, and will, when hired, as readily attack their own people as any of the adjoining tribes. They are a light-hearted people, and my experience of them is that they are faithful, quickly attach themselves, and will stand steadily by you in the time of danger. They are hardworking, and will cheerfully undergo much privation, if firmly, but kindly treated; but otherwise they are inveterate thieves (especially of anything eatable), and are very fond of singing and dancing, never tiring of the latter.

The most important institution in the country is the "Porroh," a secret politico-religious society. The novitiate is sequestered in the porroh bush for a varying time of one to four weeks. During this period he is tattooed, or rather marked, by cutting a pattern on the body, and he is given a name—his Porroh name. Wars are arranged and stopped; heirs to chieftdom approved or disapproved; and laws generally are made by the Porroh. Their decision (how arrived at I know not) is implicitly obeyed, and the power of the Porroh is thus despotic and supreme over the whole country. The government is similar to the old feudal system, the head men of the towns dispense justice in minor cases, more serious crimes being brought before the king of the district. A medicine man generally proves the guilt or innocence of the accused by ordeals. These consist of taking a stone out of boiling oil or water, or picking up heated iron; if innocent, without receiving harm. Another ordeal is drinking a decoction of sass wood; this latter is, I believe, certain death unless immediately vomited. They are very superstitious, and firm believers in witchcraft.

Land is easily obtained; the applicant simply tells the chief he is going to clear, that is, cut down the bush of a particular spot, and takes him a trifling present, such as a piece of cloth, or, if poor, a few kola nuts, and the fact of clearing the land—no light work—is considered by all as a sufficient title to its possession, so long as it is cultivated. If left by the occupier it is free to the first comer. Europeans on many

parts of the coast have bought lands of the chiefs, and difficulty has subsequently arisen therefrom, as I doubt if in any single instance the seller has thoroughly understood that he was parting with the land for ever. One fruitful cause of war is the pernicious system obtaining of seizing the person or property of an individual because another inhabitant of the same town is indebted to the person seizing. If the debtor or his friends is enabled to pay, no harm results; but otherwise the friends of the person detained take the first opportunity of seizing some one from the other side, these reprisals culminating in war.

Their houses are circular, built of mud and wattle, and thatched with palm leaves. When completed, the walls and floors are smeared over by the women with cow-dung. This gives a hard smooth surface, but for some days the smell is objectionable. Frequently, when my visit has been anticipated, the hut prepared for me has been freshly smoothed over the day before, to my great annoyance. The men do the heavy portion of their daily work and clear the bush, but the women till the ground, fetch water, go fishing, and cook and prepare the food. They also spin the cotton into thread, dye it, and make mats; but the men weave, sow, and make their own clothing. The Mendis are noted for the beauty of their country cloths; they also make earthenware pots and pipes. The blacksmith, a slave, is an important individual, and is respected. The women are especially gracious to him, as he makes the silver or gold they may take him into rings, bangles, and brooches, without charge. The Mendis are polygamists, and attached to their wives and children. Circumcision is practised by both sexes, usually about the age of puberty. Their principal weapons are swords and spears, with small knives or daggers; they are very quick with the former, and generally strike at the back of the neck, severing the spine. They have flint guns, which they load with heavy charges of powder and jagged bits of iron, occasionally clay bullets. These guns are effective at 100 to 150 yards, and make very ugly wounds.

In 1886 I had the honour of suggesting to the late Governor of Sierra Leone, Sir Samuel Rowe, K.C.M.G., the advisability of connecting the navigable heads of the rivers of the settlement by a good broad road, believing that such a road would stop the petty wars, or rather system of plundering carried on by the natives within that area, to the stoppage of agricultural pursuits, and consequent detriment to the trade of the colony. This suggestion has been carried out, the result proving so satisfactory that British influence over the surrounding country has since been greatly extended, and the old palmy days of Sherbro are fast returning; competition and low prices of produce will prevent the merchants realising the profits they did in years gone by, but a lucrative trade may still be carried on.

The Mendi country is very rich in palm trees (the *Elæis Guinéensis*), from the fruit of which is extracted palm oil, the kernel supplying the

well-known palm kernel of commerce. The produce of this tree constitutes the present wealth of the country; but the Mendi country produces rice in abundance, and when the merchants will turn their attention to this article, and ship it instead of storing it, to exchange later on for palm kernels, rubber, &c., the natives will grow it to a much greater extent. At present they only grow sufficient for their own wants; a portion of this they virtually pawn to the merchants for European goods, redeeming it later on with other produce. Surely if it pays to bring rice all the way from India to England and then tranship it down the coast, it should pay to ship it direct from Sierra Leone. There are rubber-producing plants, at present untouched; cam-wood in small quantities; cotton is plentifully cultivated, and red pepper; while indigo grows almost wild. Ivory and gold comes from the far interior. The present Governor has done much for the trade of the colony by opening up existing roads and making fresh ones leading to the riverain towns.

I shall now give some details of my various journeys throughout the colony. I have made numerous visits to Kambia at the navigable head of the Great Skarcies river, going both up and down the river as also overland from Port Lokko. In January, 1885, I carefully searched for the Kaba or Macarthy river. The natives at once told me the Kaba was the native name for the small Skarcies; the name Macarthy was unknown to them. I went up the opening on the left bank of the Skarcies river, marked on the map as the Macarthy river, and, after some little trouble, found it emerged again into the Skarcies river higher up. Just below these openings there is a narrow entrance about seven feet wide in the mangrove bush, that the natives told me got wider inside, and goes a considerable distance. There is, however, no traffic on it, and it can be of no importance. Going by land from Kambia, nothing but small streams are crossed to Mange or Ito-Mange, on the Kaba or Small Skarcies river; the country is open and undulating, with streams all flowing to the west. Mange is situated on the right bank of the Kabba river, just below the first falls; thence to Port Lokko the country is undulating, the ridges lying nearly north and south; the surface is a laterite with sandy mud, and swamp in the valleys.

From Kambia the main road leads to the interior in a general north-east by north direction to Kukuna, passing Bassia and Gbullo; Bassia is 220 yards from the left bank of the Skarcies river (which is here about 250 yards wide), and Gbullo about one mile in a bee-line. From Gbullo the town of Tassin, in Benna, on the right bank of the river, which is called here the Kolentang river, can be seen distant about one and a half miles. Kukuna is one and a half miles E.S.E. from the Kolentang river, which flows from the north. Laya, Digi Digi, and Senaya are all on the right bank of the Kolentang or Great Skarcies river. Canoes are continually passing between these towns and Bassia, and occasionally from Bassia to Kambia. Upon several

occasions when at Kukuna the sky was perfectly clear, and the stars bright at 5 a.m.; at sunrise a fog came on, which increased in density till nothing was visible over 100 feet off; it then slowly cleared, the sun breaking through between 9.30 and 10 a.m.

Leaving Bassia, I struck to the south-east to Sobani and Ro-Bonkor where the Chief of Tonko (Limba resides; then south-easterly to Katiri. Five miles south-east by south is the Kabba river, running to the W.S.W.; it is about 200 yards wide, and too deep to pole. About 10 miles S.S.E. is the town of Karene, situated about half a mile north from the right bank of the Mahole river, which is here about 200 yards across, with rocks and rapids just above the ferry. Leaving Karene on the 10th of June, I proceeded in a north by east direction, to Yankabana, in upper Sanda. It is a clean town, healthy and cool. Although so near to Port Lokko, I was told I was the first white man who had ever been in the country, and the natives came long distances to look at me. As the huts were very dark I had my portable table placed under some orange trees outside; here I sat at work, when a ring at a respectful distance was formed, and they closely watched me, but if I looked up suddenly, there was a general stampede. However, a few days' quiet talking and distribution of trifling presents overcame their fears, and convinced them that I was not such an awful being after all.

One and a half miles from Yankabana there is a fine view to the north-east, with a distant range of hills. The highest, bearing 66 degrees magnetic, was pointed out to me as Sagari Hill in the Lokko country. The intervening country is flat, and appeared to be covered with tall grass. A short distance from the foot of the hills is Ro-Bonkor, on the left bank of the Tang river. This flows into the Kabba river near to Laminaya, which is on its left bank close to the junction.

The Sanda country is fairly open and undulating, the soil laterite. From Karene I crossed the Mahole river opposite Mabanta; it was about 100 yards wide, with a slight current; thence through Kabantana and Malal to Port Lokko. The country is bushy and undulating from Karene to Malal, thence across a plain six miles long, covered with tall cane grass, to Port Lokko. The Sandas are a fine healthy looking people, happy and prosperous. Being off the main roads to the interior, they have little communication with other than their immediate neighbours, and there was a refreshing healthy innocence about them that the chiefs are trying to conserve, by objecting to the youths and the women going to Port Lokko or to Freetown, saying, "Ah Massa! dem place no good, they be bad place pass mark." There is ironstone and mica in the country; they gave me small pieces of the latter, but nothing would induce them to show me where they procured it, saying the Devil lived there and he would not allow me to go. In Tonko Limba there is Blue John (Derbyshire spar), and

this has been mistaken by some few Sierra Leone traders, as well as Europeans, for sapphire, and has given rise to the idea, still entertained by some, that there are precious stones there.

A native came to me one day desiring to see me privately. After the door was shut, he looked carefully round to see nobody was there and then produced a dirty handkerchief. This contained another, then some paper, and afterwards some raw cotton. From this he produced a piece of broken glass (a portion of a dead eye from the deck of some small craft), and asked me if it were not a diamond. I could not help laughing, but at the same time pitied him as he looked so downcast. He did not altogether believe me, as he wrapped it up most carefully, and begged me not to name it to anyone.

In June 1887, I went up the Yaltucker river to Yapoma, at its navigable head, and not far from its source. There I landed, and proceeding in a general northerly direction, arrived at Mocobo, on the left bank of the Kaghboro river, about five miles in a bee line from Yapoma. I then struck to the south-east to Konkonany, at the head of a small tributary of the Mano Bagru river, and returned to Bonthe by the Mano Bagru river. Shortly after leaving Yapoma the country is undulating, covered with dense overhanging bush, and the same between Mocobo and Konkonany; the Mano Bagru and its tributary, the Gambia river, are navigable all the year round for boats of light draught. Their mud banks are covered with mangrove bush, and at low tide a wide strip of green, slimy, strong-smelling mud is uncovered on either side, a hotbed of malarial fever germs.

In July, 1885, I went up the Bandakor river, a tributary of the Kittam, which flows into it just above the town of Bompetak. The entrance is very narrow, but it quickly widens; the depth varied from 5 to 12 feet for the first 3 miles, when it shoaled to 3 feet, but deepened again to 12 feet off Manni, situated on the left bank, about 3 miles from the entrance. The water of the river is dark brown. Manni is a small unfenced village of 10 houses, on high ground some 50 feet above the river. During the rains the road from Kulu to Gombo is impassable, and then the traders from the interior come to Manni, and hiring canoes here, carry their produce to one or other of the numerous factories on the Kittam river below Bompetak. The country between Manni and Bandalahun (about 15 miles north-east) is undulating and rocky, until approaching the Kittam river, where water and swamp are met in the lower parts. Below Bompetak, to what is called the bar-mouth (the junction of the Kittam river with the arm leading to Kasch Lake), there are numerous small towns. Here the European and native merchants have their factories or stores, and collecting the produce of the country send it down the river to Sherbro for shipment to Europe. The Kittam river is navigable for small boats as high as Gombo, where rocks and falls bar the passage.

In October, 1887, I went through the Bombateno to Sulima in an

eight-oared boat. Leaving Lavana at 8 a.m., we pulled past Kase to Bomboma, along an arm of the lake, whence we had a difficult passage of $1\frac{1}{2}$ hours across submerged fields to the creek, which was barely wide enough for the men to work the oars. The stream rushed along like a sluice, and as the turns were continual and sharp, and the passage frequently blocked altogether by fallen trees, our progress was accompanied by much labour and considerable danger. The overhanging bush swarmed with red ants, and the water with leeches, which fastened on the men's legs whenever they got out. This they were frequently compelled to do, in order to clear away the fallen trees and other obstacles; moreover, it rained heavily the whole day, and we were all thoroughly soaked and knucked up when we reached Sulima at 11 p.m. after one of the most disagreeable day's journeys I have experienced.

Mabessi Lake, to the north of Kase Lake, has its outlet in the Kittam river, near Tobanda. It is about four miles long, and $1\frac{1}{2}$ broad. In November 1887, I entered it from the Kittam river, and sailed along its centre, to Bandakor, at the extreme end. There was no bottom at 15 feet all the way, and I was told that it never dried up entirely. Three miles from Sulima, along the beach, the lagoon connected with the Mano river is reached, and three miles farther Mano Salija. Just beyond this is the Mano river bar; the river near its mouth is wide, but very shallow. The lagoon swarms with crocodiles. Above Mano Island the river narrows and deepens and the stream runs strongly. The Sulima river is wide, and very shallow at its mouth; Sulima Island, about $1\frac{1}{2}$ miles long by three-quarters broad, divides it in two. There are rocks at the upper end of the island partly submerged, which render navigation difficult.

In March, 1888, I left Bandajuma, on the right bank of the Kittam river, and proceeding in a north-easterly direction a distance of about 27 miles, reached Wende, on the left bank of the Kittam river, which at this point is but a small stream. On the way were several towns, all destroyed. Until nearing Wende, the road was through dense overhanging bush, with a good deal of water in the depressions. Near Wende, however, it is open and undulating, with hills in the distance. Wende, the stronghold of the great war chiefs Darwa and Mackia, formerly the terror of the surrounding country, consisted of thirteen towns, with from three to five fences each, held by as savage and ferocious a set of war boys as I have met anywhere in Africa. They had with them between three and four thousand captives, men, women, and children, whom they were gradually selling into slavery. Five miles from Wende is the town of Gorpemde, on the left bank of the Kittam river, consisting of two large fenced towns, both again surrounded by an outer fence, high and straight, without the usual chevaux-de-frise on the top. Gorpemde and Wende are in the Bowe land. A hill a short distance off, bearing north-east, was

pointed out to me as the boundary between the Bowe and Bambara countries.

I left Bandajuma again on the 2nd of June, 1889, and passing through Jimi in the Lubu country, arrived the following day at Mafwe, at the navigable head of the Bum river; the country generally was open and the soil a sandy clay. The road is a magnificent one for Africa, being some 40 feet wide, and the streams bridged. From Mafwe I proceeded about 23 miles in a general north-easterly direction to Bumpe; the country was undulating, with low overhanging bush, much water, and the soil a slippery clay. The district takes its name from this, Bumpe being Mendi for slippery. Bumpe, consisting of eight towns—three walled—is in a sharp bend, and almost surrounded by the Tabo river, a tributary of the Bum river. Leaving here the next morning, and crossing the Tabo river, about 100 yards wide, with deep dark water, unlike that of the Bum, I travelled 12 miles nearly due east, to Tikonko. Blocks of syenite crop up to the surface of the road, which is hilly and covered with vegetation. Tikonko consists of four towns, two strongly fenced, the principal having 805 houses. Twenty-five miles south-east of Tikonko is situated Largo, on the right bank of the Luye river. When I visited it in August, 1887, it consisted of nine towns, four fenced; Gupaybu, the principal (containing 340 houses), had five fences, and the Chief Mackia had overrun the surrounding country. It was now, however, a mass of ruins, a just retribution having befallen the chief, who was a fugitive. Eleven miles farther south brought me back to Bandajuma, two days' journey from Tikonko.

Early in March 1890, having completed the necessary preparations for an extended journey to the interior, I left Freetown for Port Lokko, where I engaged the remainder of my carriers. My party consisted of eight Mendi hammock men (good men, some having travelled over 2000 miles with me in the bush), 14 Mendi carriers, with 50 Timinis engaged at Port Lokko, ten men with guns, and two interpreters; a total, with my own servants, of 90 men. The loads consisted of cotton goods, salt, beads, and a little tobacco, with rice, herrings, and a small quantity of tinned provisions, in addition to my instruments and private stores. The loads were heavy, many over 75 pounds, but each day lightened them, and they were soon reduced under 60 pounds weight.

I assembled the men at 4.30 a.m. on the 16th of March, and we left shortly after 5 a.m. It was a dull foggy morning, which added to the depression I felt at starting on a journey whence so few return. Proceeding in a direction E.N.E., I halted at Ro-Makka, only eight miles distant, going on the following morning in the rain across the Sogboni stream (the boundary between Lokko and Makama) to Melakori, a clean town of 131 houses. Most of them were empty as the

inhabitants had fled, fearing a war in the neighbourhood. The rain had exposed many weak places in the loads, so we halted on the 18th, drying such packages as were wet, and generally rearranging the loads for a definite start on the following morning. Leaving at 6 a.m. we passed through Kambia in Makama (the boundary between it and Buya), and passing several small villages halted for the night at Ro-Sint, 10 miles east of Melakori, proceeding the next morning through several small villages to Ro-Bana; the country traversed was low lying and swampy. We left at 5.30 the next morning, over a large swampy grass plain, which the Baling river crosses to the north-west (forming the boundary between Buya and Bombali), and arrived at the small village of Tonkomba, 11 miles from Bana, at 9.30 a.m. The inhabitants here say they go fishing to the Maboie river near by on the north; but unless the Maboie winds in the most extraordinary way it is difficult to believe it is other than a tributary of it. From Tonkomba the road traverses tall grass plains, with much greasy mud, making travelling fatiguing and difficult for the men with loads.

Upon nearing Kerife the ground rises, but it was covered with tall grass from 10 to 12 feet high, through which we forced our way with difficulty, the men suffering much from the heat. The Chief Abdul Lalai Kallokko, a Fula, received me well, and supplied me with milk and honey. He has a comfortable house, boarded and painted. The village, containing 65 houses, was clean, and the people prosperous. Alas! three months later, hardly a soul was left, they having fallen victims to that dreadful scourge, small-pox. Pushing on the next morning over an undulating country, through several villages, we reached Kunso, five minutes beyond which is the Mabosani river, flowing to the north-west (the boundary between Bombali and Saffroko Limba); thence ten miles to the Masumani river, the boundary between Saffroko and Biriwa Limba. Five miles further I crossed the Madaku river, and reached Kamaure at 3.30 p.m.; and on crossing the Matala river, flowing to the north-west, the town of Bumban came in sight, surrounded by hills which rise in peaks around it. It is very hot and unhealthy; the houses, 154 in number, are small, and fairly clean. There are some magnificent cotton trees here, under which the natives were weaving country cloth. The chief, Suluku, is a dissipated, dirty man, extremely superstitious; he regarded me with some misgivings, and openly accused my Mahomedan interpreters of being Sofa spies who were going up to bring the Sofas down to destroy the country. I did what I could to disabuse him, and we exchanged presents. I asked Suluku to obtain men for me, which he promised to do, but, notwithstanding my making him handsome presents, on the fourth day he only produced five little boys; I therefore determined to push on with the men I had. By repacking the loads I was enabled to go on, minus two carriers, who, being too ill to proceed, I sent back to

Lokko with letters, &c. We were now 73 miles from Port Lokko, and 116 from Freetown, having crossed the alluvial plain between the coast and the hills. The road now for some days' journey would be over steep mountain ranges, the hills rising abruptly some 400 to 800 feet, to go down again on the other side.

Leaving Bumban on the 29th March, at 6 a.m., we advanced one mile in a north-east direction, to the foot of the hills, composed of masses of aenite. The first ascent of 500 feet was very steep; then for some distance we proceeded along a narrow path of about 12 inches in width cut on the eastern side of a steep slope, both difficult and dangerous. To the right, on the eastern side of the valley, was a huge smooth and almost perpendicular hump of rock, about 800 feet in height; the hills were in confused masses on either side, but with a general direction north to south. We passed three villages, the natives turning out *en masse* to see the white man, and after crossing several smaller hills we reached Ka-Wana at 11 a.m., having been five hours covering a distance of nine miles. Ka-Wana is a small clean village of 36 huts, above 700 feet above Bumban, the air deliciously sweet and pleasant after the close steamy atmosphere of Bumban.

Leaving Ka-Wana at six the next morning, we went down considerably. The road, which was heavy, but better than that of yesterday, skirted the left-hand side of a range of hills, Surinumuya, on the main trade road, being to the west of the range of hills on our left; the Surinumuya road being also west of that I was following. The Maholo river flows to the west of Surinumuya, and is not crossed in going from Kamaure to Bumban. At 10 a.m. we arrived at Ka-Makonta, a small village built on a mass of broken rock with hardly a level square yard in it, distant eight miles from Ka-Wana, where we halted. Upon leaving Ka-Makonta the road goes down 350 feet, then along a valley, in which there is much water. At Ka-Ketuhu the Makentomba river is crossed; between this and Ka-Manke there is much swamp; the road then goes over a hill, and, skirting others, gradually rises to Ka-Bassia, situated on the top of a hill 800 feet in height. Between this and Ka-Timbo, 10 miles from Ka-Makonta, it gradually rises to about 1000 feet, there being some very steep ascents in places. Leaving Ka-Timbo at 7 a.m. on the 1st of April, we went down steeply about 500 feet; then along a valley three miles N.N.E. to Ka-Fogo, containing 289 houses, cleaner, and the huts slightly larger and better than those at Ka-Timbo. Major Festing, in passing here, was obliged to use a show of force before he was permitted to proceed; and I anticipated some trouble; however, other than the assurance of the chief, that if the Sofa war came down, the whole country would fight me on my return, our relations were most amicable.

Ka-Fogo belongs to Suluku, and is the boundary between Biriwa and Warra Warra Limba. Leaving Ka-Fogo at 6 a.m. on the 5th of April, we proceeded along an uncleaned road, covered with thick bush and tall

cane grass. There were many steep ascents and descents of about 200 feet, over rough rocks. For some distance the road skirts the right bank of the Mawaloko river, a tributary of the Rokelle river, and boundary between Warra Warra Limba and Koranko. A thunder-storm the previous evening had soaked the bush, which, with the fierce sun pouring upon it, was in a hot suffocating steam, and it was past noon before we reached Konkoba, having been upwards of six hours going a distance of nine miles. Upon going to see the head-man I saw several natives affected with small-pox, and learnt that it was raging in the town.

Upon leaving Konkoba the road rises gradually for a short distance; then there is a steep descent and a steeper ascent on the other side. Instead of leading, I had stopped behind, in order to see all the party out of this pest-stricken place, and had just reached the top of the first descent when I heard war cries, and a great commotion, and saw armed men converging towards the stream at the bottom; I jumped from the hammock, and ran forward as fast as the road would permit, arriving just in time to save a fight. The natives had some of my carriers prisoners, and their comrades, cutlasses drawn, were about attempting a rescue. It was some few moments before I could control my own men, and make them fall in by their loads, and still longer before I could induce the natives to bring forward their complaint, and the prisoners they had. It appeared that some of my Mendi carriers, seeing a fine field of cassava, could not resist the temptation to steal some, and had crossed and trodden down a lot of rice in going to it. The punishment of the thieves and recompense for the damage done finally settled the dispute.

We proceeded to Dankang. Dankang contains 121 houses, built among enormous boulders of syenite. Leaving this at 6 a.m., we passed through Pompong and arrived at Bafodia, nine miles N.N.W., at 1 a.m. About two miles from Bafodia there was a fine view to the N.N.W. A ridge lying about north to south was pointed out to me, as being in Sella Limba; the Monko river flowing in the valley to the east of it, about one mile distant, the Kabba river on the farther side. Bafodia is prettily situated on the south side of a small hill with valley below it. This town is close to the borders of Sulimania, and is the last town belonging to the Limba tribes. The hill tribes are early and inhospitable, objecting to the passage of travellers, and themselves rarely visiting the neighbouring villages. They are finer in physique than those in the plains, but a savage, unkempt race; their clothing, native made, is dyed a dirty brown, and from its appearance I should judge is never washed nor changed.

With the exception of a few cotton handkerchiefs, and some beads, I saw no article of European make in either Biriwa or Warra Warra Limba. Their weapons consist of spears, and bows and arrows, the

latter poisoned; the heads are barbed and bent, which gives them a rotary motion and enables them to dispense with feathers. Kola trees abound, also locust trees and *lophira alata*; they cultivate cotton, rice, guinea corn, cassada, fundenji, and sweet potatoes. I left Bafodia on the morning of the 10th of April. The road rises steeply 500 feet, and then goes gradually down, the country undulating, with hills on either side. About seven miles from Bafodia, two high massive peaks of granite are passed on the right hand. About one mile east of this a mud swamp marks the boundary between Warra Warra Limba and Derubellia in Sulimania. Nine miles north-east the Kiffa river, flowing west to the Monko river, is crossed, a short distance beyond the partially built town of Mussia. The Chief Dusu Suri reported the fearful havoc and destruction caused by the Sofas, who had utterly destroyed not only every town (Kaliere excepted) in Sulimania, but the northern part of Kuranko, the whole of the Sangara country, and the countries to the north and south. He said he and his people were on the watch, as they expected the Sofas daily, on their way down to destroy the Limba and Timini countries. I was much concerned at this, as it seemed probable my journey would be cut short here. The following evening there was a rumour that the Sofas were advancing, so we kept on the alert. The chief beat his drum and assembled his people, to send them forward, as he said, to the hills to act as scouts, and keep watch; as a matter of fact, they all went in the opposite direction, and hid themselves in the bush, leaving us alone in the town. Two days later I heard the chief and his head-men were going to hold Saraka (a semi-religious ceremony) over the grave of the late chief to ascertain whether I was *bona fide* in my professions of friendship, or whether I was going to invite the Sofa war down to "eat up" the country.

It was of considerable importance to me, so I asked permission to take part in it, which was accorded. We sat in a circle round the grave of the late chief; one of the old men then called upon him, telling him the Sofas had come down and destroyed all his children, they alone being left; a white man had come up, professing to be their friend, but they did not know what to believe, and invoked his aid to prevent their utter destruction. The names of all present were called out; some rice flour made into a paste with water was then produced, as also some red kolas, and a small calabash of water. The kola nuts were split with great solemnity and carefully placed in the water; the old man then took them out in his hand, and calling upon the chief to answer him, threw them up, allowing them to fall into the water. The majority floated on several successive trials with the inside uppermost, which proved I was their friend. The kolas were then divided and eaten on the spot, together with the paste, after which there was much rejoicing, and, later in the day, the Chief of Falaba, who was present, produced a large tusk of ivory which he handed to Dusu Suri to give to me. Two hours later

a scout came in, reporting that four messengers had come to the next village, and were on their way to demand the surrender of the Limba countries to the Almami Samadu, the Sofa chief. I immediately sent my interpreters with an escort, to interview them, requesting them to go back, and report my arrival, and intention of visiting them. This was done, and six days later the Chief of Kahere sent to say he should be pleased to see me, and would send to the Sofa chief to apprise him of my arrival and friendly disposition.

The town of Mussia is situated a short distance from the left bank of the Monko river, over which is a flying bridge; it has been a very large town, but there were only 157 houses rebuilt. Leaving Mussia on the morning of the 22nd April, I proceeded six miles to the deserted town of Sinkunia. For a portion of the way the road skirts the left bank of the Monko river. We made an early start the next morning. For some distance there was a succession of steep ascents and descents, water with mud and swamp in all the valleys, and for miles we had to cut and force our way through the tall cane grass, some eight to 10 feet in height. When about seven miles from Falaba we crossed a small river flowing to the north-west along a valley lying north by south; here, through the tall grass, there were tracks of elephants, which had rooted up many small trees on the way. We reached Falaba, a distance of $18\frac{1}{2}$ miles, in eight hours, all the party much knocked up with the heavy road.

Falaba, standing in a good position, has been a large town. The ring of cotton trees, marking the fence, encloses about 600 acres. It was destroyed by the Sofas in 1885, when the chief blew himself and family up rather than fall into their hands; it was partially rebuilt, but utterly destroyed by the Sofas again in 1889. The thatch remains on five houses only, which the party occupied; bleached skeletons lie scattered all over the place. Some bodies at one end of the town, smelling offensively, proved they had been recently killed. Two Sofa scouts were here, and reported that a party of Sofa horse had ridden over from Dantilia that morning, expecting to find me there, but had returned, saying they would come the next day. I therefore left early the following morning, to avoid any intention they might have of detaining me, and after six hours' heavy travelling (having to clear our way for miles through the tall cane grass) arrived at Kaliere shortly before noon. The chief's son came out on horseback to meet me, and conducted me into the town. This is a good size, consisting of 469 huts, circular and fairly roomy; they were all crowded, appearing to average about 10 to each house. There were 40 horses in the town.

The Chief Manga Isa, an old and intelligent man, is wealthy, and by receiving the Sofas and supplying all their demands upon him has, so far, saved himself and his people from the general destruction; but from a private conversation with him I gathered that he was ill at ease,

fearing any day they may make some excuse to attack and plunder him. He confirmed the news that this was the only town left between Mussia in Dembellia and Mussia in Trong, in the Wassulu country, a distance of about 190 miles, and doubted my being enabled to proceed farther inland. I sent to the war chief Kehimo Billali, expressing a desire to see him, and he consented to come, but not without his war. For the next few days the people of the town were hard at work putting up sheds and grass huts, a quarter of a mile away, for the accommodation of the war, which was not to be permitted to enter the town. On the morning of the 28th April there was four hours' continued weird music, played by the Sofas, as their troops arrived in companies.

At 4 p.m. I was told all was ready, and going outside the town I found the old chief and his party already seated under a large cotton tree, with a space left for myself and followers. Messengers were riding backwards and forwards to Billali, who had massed his men nearly out of sight, in the grass and bush about 800 yards off. There was a fine open space between us, level and covered with short grass. There were about 200 horse in companies of 30 to 40 each, and about 1800 foot, also in companies, headed by their chief on horseback. Shortly some of the horse advanced taking position on their left, facing at right angles to their front, then another troop advanced in the same way, coming nearer, and soon they came within 500 yards. The first troop then crossed their front, and wheeling to the right advanced at a gallop, passing to our rear, and wheeling round returned on their left flank. The remainder then advanced in companies passing our front, firing guns in the air, brandishing their swords, turning in their saddles and throwing their arms and legs about, apparently to show they were perfectly at ease, and could do as they liked in the saddle. They made their horses carvet and prance about, and one twice pulled up and made his horse drop on its knees in front of me. For about an hour they passed and re-passed, producing the effect of a very large number. After this the foot soldiers advanced in masses, with a rude attempt at formation in companies, headed by their chief on horseback. They passed at a run, many firing their guns; all were armed with guns, mostly flint locks, but a few percussion guns. After passing and re-passing, they took up their original position, and then advanced slowly in a compact body, Kehimo Billali, their chief, in the centre in front; the foremost ranks were stooping, and at times kneeling, but creeping up the whole time, although at first sight they appeared stationary.

Billali was mounted on a light grey horse, richly caparisoned and stained lightly in places with blue; he himself was dressed in a heavy cumbersome war dress, covered with gris-gris of various colours—blue, brown, red, white and yellow. It looked rich at a distance, but hot and cumbersome. They advanced to within a few feet: he then took them back a short distance, and dismounting, came on foot to me. He is a

young man with a heavy, unintellectual face, sensual lips, and an unfeeling brutish look: he is, however, liked by his followers, who speak well of him. I complimented him upon the appearance of his army and expressed pleasure at meeting him. I promised to call upon him in the morning. This I did, and found him seated under a shed made of palm leaves. Although the camp was very dirty, men and horses all mixed together, there was order and discipline, men being on guard at all points. He said the Almami Samodu had sent him to eat up the Limba and Timini countries and thus open the road to Port Lokko. I protested strongly against this, saying the Governor of Sierra Leone would be very angry and send soldiers to fight him; he said he could not disobey the Almami's orders, and pressed me to return with him, promising to carry me safely through to Port Lokko. After a very long argument, he consented to wait pending further instructions from the Almami; he also promised me an escort, saying that the whole country was destroyed. I gave orders for an early start, but the head-men came one after the other, saying their men refused to go any farther, and urging me to return, declaring the Sofas intended carrying the war down directly I left, and there being no possibility of our returning, we should all perish. The truth was, they had never previously seen any cavalry, nor so large a body of men armed with guns, and they were thoroughly cowed. Fortunately, I was within the Sofa lines, and they could not return without my consent; I therefore told them that as they wished to desert me, I should desert them and they might all go, and I asked the chief for carriers; these he promised and produced. My men, finding I was determined, and that they had to choose between following me or becoming the slaves of the Sofas, came in one after the other, and before starting they had taken up their loads, though they looked very woe-begone, and, I believe, thought they were doomed.

I left Kalliere at 6.30 a.m. on the 30th of April, and after a very fatiguing journey reached Dantilia at 5 p.m., where another branch of the Sofa war, composed of 40 horse and about 500 foot, were camped in grass huts. The head-man received me well, and gave me five grass huts for my party. It was raining, and as they leaked badly we passed an uncomfortable night. The road was slightly undulating, with hills on either side, the air cool and pleasant. We were now on the first plateau, about 2000 feet above the sea level, the soil a shallow sandy earth, over granite and rocks of laterite. The next morning we proceeded 10 miles to Sulimania along a good road, over undulating country, covered with short trees and short grass, streams all flowing to the north-east. I lay awake for some time during the night, being in a state of excitement at the prospect of seeing and crossing the Niger river in the morning. Starting along a good road over undulating country, after five miles we came in sight of a shallow valley about two miles wide, through which the Niger flows; the trees, which were thick

in the lower part, prevented the smallest glimpse of the river. About the town I counted over 100 bodies lying at the side of the road, in various stages of decomposition, emitting the most sickening odour. It was a ghastly sight; all had their arms tied behind them and the heads quite or nearly severed, showing they had been killed in cold blood.

The Niger river is the boundary between Sulimania and Sangara; the latter is divided into Wulaledugu and Konedugu. I halted for the night at Bantu in Wulaledugu, $17\frac{1}{2}$ miles from Sulimania. Proceeding the next day for $12\frac{1}{2}$ miles we reached Nyamana Konde, in Konedugu—the boundary town—nine miles beyond which is the Mafu river, which I crossed to Jinkudaro.

The river is about 150 feet wide, flowing to the N.N.E., current about two knots per hour. Jinkudaro has been a very large town, but is utterly destroyed. Seven miles farther we came to the Furu river, flowing E.N.E., three miles beyond which is the town of Sininkoro. The past two days' journey had been excessively heavy, the road being overgrown, and we had literally to cut our way through the high cane grass and bush. My Sofa escort were indefatigable; upon reaching a town where I decided to halt they went into the bush, and cutting wood, and tall grass, quickly made a temporary roof, then sweeping out the charred remains of one of the destroyed huts (occasionally skeletons as well), they hoisted the roof on to the walls, and I had fair protection from the weather. It was never rain proof, but a water-proof sheet stretched over the bed kept me dry, and I might have fared worse; my followers collected grass for themselves and kept fairly dry. Sininkoro, the capital of Sangara, has been a large town; it was utterly destroyed, and bleached skeletons were scattered about. The town, situated on high ground, is open, the soil loose laterite and red sandstone. Here my friend the late Major Festing died, on his way back after visiting Almami Samodu in Wassulu; he is buried in the centre of the town. I replaced the fence around his grave, and planted a cotton tree at the head, which will, I trust, preserve it from molestation.

I left Sininkoro on the morning of the 10th of May, and halted at Sirieria, proceeding the next day to Kinyako, thence to Baghbe, situated in a plain one mile from the left bank of the Nyandan river, and $18\frac{1}{2}$ from Kinyako. The following morning I crossed the Nyandan river, which was 200 yards wide, waist deep, with a stream of $1\frac{1}{2}$ knots, by far the largest river we have crossed. Shortly after crossing the river, and not far from it, I was shown numerous circular pits from which the natives have extracted gold. On the 14th of May I crossed the Milo river, the boundary between Sangara and Trong in Wassulu. The river was 150 yards wide, up to the men's arm-pits, a current of $2\frac{1}{2}$ to 3 knots, the bottom a coarse quartz sand; two miles south-east of this was Mussia, the first undestroyed town we had met since leaving Kallere on the 13th of April.

The Sangara country is open and undulating, low hills in the distance on either side of us, but nothing very marked; the soil is a light sandy clay and earth, with laterite rocks and gravel. The vegetation is not so profuse as nearer the coast, consisting of small trees and low bush, with short grass, except in the valleys, where it is tall; the streams all flow northerly, but there is no well-defined range in this direction to mark the water-shed of the Niger and its tributaries. In Sallimania the streams crossed flow to the south, except such as go north to the Monko river. Kaliere would appear to be on the summit of the range dividing the streams flowing to the Niger on the one hand, and the Skarries on the other. The water-shed is ill-defined, the country after leaving Falaba being fairly level. The mountain ridges and valleys the whole way up, as well as the smaller undulations near the coast, have a general direction north to south. Besides tracks of elephants near to Falaba, we have seen the footprints of leopards, and have heard the jackals and wolves of a night.

Twenty miles south-east is the town of Bissandugu, the soil traversed being a light-coloured sandy earth and laterite; the vegetation still more scanty, and entirely different to that nearer the coast, the locust being the only tree I recognised. Near Bissandugu I saw for the first time the Shea butter tree; rice farms were on either side of the road, and there seemed no dearth of cattle. Milk and honey were freely brought me. The streams were fewer and farther apart, and I was told that farther inland water was very scarce. That we had at Bissandugu was very indifferent.

Bissandu, called by the natives Bissan or Bissandugu, meaning Bissan's place or country, is an unfenced town, or series of towns, containing 2723 houses. The Almami Somodu was here, and received me with considerable state. In the centre of the town was a large open space; this was densely surrounded by between seven and eight thousand people. At one extremity was the mosque, to which I was first directed, and then invited to go to the Almami, who was facing us across the open space. I went over, and giving him a military salute, advanced and shook hands with him; he was seated in a leather-covered arm-chair of European make and did not rise. His dress was a gorgeous silver-lace gown and a turban of white lawn, brought across his face and concealing all but his eyes; these were darkened with collyrium. He was surrounded by his chiefs, his sons, and wives. After the usual complimentary speeches, he paraded his mounted troops, and then directed some of his people to take me to the huts at the south-west end of the town. The following day I called upon him at his palace; this was fenced in, the gates guarded by armed men. Crossing a courtyard, I passed through a couple of huts joined together, and into an inner one, spacious and very clean, well lighted by doors, opening on an inner yard. Here he was seated; an iron kettle full of water was at

his feet, out of the spout of which he frequently filled his mouth, and washing it, squirted the contents out into a big tin bowl at his feet. Before the meeting was over, he had a small tin tea-pot brought him, out of the spout of which he drank, and he rubbed his hands and feet all over with fresh butter.

He wore a blue Mahomedan gown, with white trousers and slippers, a red fez cap, over which was a gorgeous circlet of imitation precious stones, diamonds, sapphires, &c., in fact, a gaudy tinsel crown. Facing him sat his councillors, among them Tassile Manko, who went to Paris with his son. He spoke in Arabic, expressing great pleasure at seeing me, according me a hearty welcome, and later he referred with much regret to the death of Major Festing. I mentioned the scenes of bloodshed I had seen on the way. This he said the Sangara people had brought upon themselves by their treachery. I urged him to recall the war I had met on the way up, which he promised to consider.

On the 23rd May he paraded all his family and chiefs, with their followers, in honour of my visit. I was conducted to one side of the mosque, in the same open space in which I had been previously received. Some 8000 to 9000 people were present in a large circle, many deep; two bands, one, on either side, were discoursing weird music on ballangees and a native hautboy. The chiefs were mounted and dressed in varied coloured robes of different material, from silk velvet and silks to plain white shirting and blue baft; their horses were richly caparisoned, the saddles mostly of leather, ornamented with patterns of leather, worsted, flannels, &c. After they had ridden round for some time, they formed up, and the Almami rode on to the ground on a splendid chestnut-coloured horse, with a rich saddle and cloth, a crescent and star embroidered in gold in the corners, and gold lace and fringe. The pistol holsters appeared to be gold, and the stirrups gilt. He was dressed in a rich rose-coloured silk gown, light trousers, boots and yellow leather leggings embroidered in colours. His silver spurs were fastened round the ankles with silver bands. He was followed by about 20 of his sons, all mounted, young boys of from nine to 17, good riders, all handsomely dressed; his favourite son on a fine dark horse, which he made kneel down before me. He was dressed in a rich plum-coloured silk velvet robe, turban covered with silver gris-gris, and a rich-looking necklet, probably gilt, with imitation precious stones. The Almami was followed by a body-guard of 36 men. In riding round, the Almami three times stopped before me, and publicly welcomed me. There were about 200 mounted men, the scene being very effective, and I was told it was a great honour paid me, as he rarely appears on horseback, and all his chiefs and family only appear together on very rare occasions.

I left shortly before sundown, shaking hands with and thanking

him. On the 25th May, I went to bid the Almami good-bye; he expressed regret at my departure, and, accompanied by his principal chiefs and a large following, escorted me to the first village, dismounting at the side of a stream, and shaking me cordially by the hand. He promised to stop his war from overrunning the Limba countries, and, sending a friendly message to the Governor of Sierra Leone, he wished me a safe return to my home and family, commending me to God's care.

I returned by a slightly different route; the country for some distance had not been such a scene of bloodshed as that I had previously travelled. The second day I halted at Banankoro, a large town of 1447 houses, $3\frac{1}{2}$ miles from the right bank of the Milo river. Shortly after crossing this, on the following day, we met a flight of locusts; they were going from north to south. We crossed them in 15 minutes, but they appeared to extend for many miles, and made a rushing noise like the first distant sound of the approach of a tornado. Two days later we crossed the Nyandan river, after which, all the towns were destroyed, and we had a repetition of the scenes on the way up. We arrived at Sininkoro on the 31st May, and at Farana on the 5th June. The Niger had deepened considerably, and we could only just ford it, the short men requiring assistance. Pushing on we reached Kaliere on the 7th June.

The Almami kept his word, and orders were here given to Kemo Billali to withdraw his war, which was done.

The road by which I had returned from Bissandugu to Sininkoro was more hilly than the northern road, and granite rocks were mixed with those of laterite. Laying in a stock of rice, and having somewhat recouped our strength, we left Kaliere on the 12th June, and arrived at Falaba the same day; pushing on the following to Sinkunia (under rain that fell in a perfect deluge the whole day long), we reached Mussia on the 14th June. I returned by the same route to Ka Timbo, where I kept to the main trade road, which branched off to the right, and passing through Ka Simpo and Surinunuya, arrived at Ka Rens on the 29th June. Our stores had long run out, it being impossible to procure anything in the country, and for days my carriers had had nothing but a few roots and occasionally sweet potatoes. I proposed their remaining here whilst I pushed on to Port Lokko and sent back stores, but the good fellows would not desert me, and carried their loads day after day without a murmur, although they could scarce drag one leg before the other. We eventually reached Port Lokko on the 4th July, our labours successfully ended. There was great rejoicing in the town, and my carriers made up for their privations by feasting to their hearts' content upon meat and rice. The Port Lokko carriers were paid off here, and three days later I left for Freetown with the remainder of the party.

In March, 1891, I left Freetown in the Colonial steamer, and proceeding

up the Kates or Ribbi river, reached Mafemgbe, on the right bank, the same evening—the steamer anchoring a short distance below the town. I left the next morning along a good road to Ro-Bari, 12 miles distant in an easterly direction, afterwards proceeding to Ro-Tofunk, on the right bank of the Bumpe river, on to Senahu, thence across the Mano Bagru to Gunjema, on its left bank, on through Tanenahu and across the Jong river, called here the Tia river, to Mano, on its left bank.

The road from Ro-Bari to Senahu is fair, over undulating country. Thence to the Jong river, over hilly country covered with forest, the road is heavy, the surface of the hills being loose pieces of syenite and laterite gravel and the valleys swampy.

Mano is a large market of six fenced towns. About 11 miles north-east of Mano is Taiama, consisting of eight good-sized towns, and 28 miles north-east of Taiama is Yele, on the right bank of a tributary to the Tia river, which falls over rocks opposite the town. Yele is in a district of the same name, to the west of Bonkaw Lenken. His Excellency Sir James Shaw Hay, K.C.M.G., the Governor of Sierra Leone, was here, arranging peace between the contending Timini and Mendi chiefs. There was great rejoicing and dancing. From Yele I went six miles north-west to Pettifu, in Tanni, thence to Matoloku, a small but very strongly fenced town, $2\frac{1}{2}$ miles north-west of which is the Jong river, called here the Bampampana. It was deep, and about 150 feet wide. This is the boundary between Tanni and Kolifa, and hence we traversed the Kolifa district to the Ro-Kelle river, which I crossed to Benkia in Bontali on its right bank. Three miles west brings you to Malal, thence again across the Ro-Kelle river to its left bank, where a ridge 400 feet high, running north by-west to south by east is crossed; thence over an undulating country to Makonto in Masimera, after which the road skirts the left bank of the Ro-Kelle river to Ro-Kon. Three miles farther east is found the town of Ro-Kelle at the navigable head of the river. Facing the town of Ro-Kelle is the town of Mabile, whence there is a good road to Port Lokko.

Mr. Garrett's paper was read by Mr. Seebahn, who prefaced it with the following remarks: The writer of this paper has been for fifteen years an official of the colony, and for the last four years acting as Travelling Commissioner under the Colonial Office, and in this capacity has had abundant opportunities of becoming acquainted with the colony. Sierra Leone was annexed by the British about a century ago, and was for some time in the hands of a Company, but in the beginning of this century was formed into a Crown colony, with the object of introducing escaped and freed slaves, and since then it has remained in the hands of the Crown.

After the reading of the paper, the following discussion ensued:—

Mr. T. B. GRIFFITH: I do not propose, in the course of my remarks, to pass over anything like all the ground covered by the excellent paper we have heard read

to-night, which has been prepared by Mr. Garrett, but I purpose confining my remarks to two of the most important of the numerous journeys made by him, and those two are—first, the journey to Bissandu or Bissandugu, a town in the Ivory country, near the head-waters of the Niger, where Mr. Garrett met Almami Samodu, and his other but much shorter journey to Wende, on the left bank of the Kittam river. It is only those who have lived and travelled in these wild and unhealthy regions that can fully appreciate the many dangers and difficulties which have to be encountered, and Mr. Garrett has with characteristic modesty, in recording for this Society an account of these journeys, made but very slight mention of the dangers to which he was exposed upon both of these expeditions. On the occasion of his visit to Wende, some thirty miles from Bandajuma, whither he had been sent by the Governor of Sierra Leone, he was attacked twice in the day by over a thousand warboys; he had only twelve well-armed policemen with him, but succeeded in driving the warboys out and rescuing a very large number of prisoners who were shut up and almost starving in the fenced towns of Wende. Only this morning I turned up some old letters and came across one from Mr. Garrett, dated December 1889, which I received in Seychelles. In a paragraph referring to the Wende business, Mr. Garrett wrote me:—"Finding there were a very large number of captives in the place I decided to attempt their rescue and destroy the place, consisting of thirteen fenced towns. Two days later, all were ready at 4 a.m., a long line of men, women and children, old and infirm amongst them; we fired the towns and started at a rapid pace, but were soon pursued by hordes of warboys. Fortunately about two miles off there was dense bush, and once we reached this they could only attack us in the rear. I kept in the rear with six men, and we blazed away at them whenever they came too near, killing numbers. It was a very hot time, as they pursued us over twenty miles. The Governor had the people counted as they entered Bandajuma, some 3000 in number." The other journey, which has taken up a considerable portion of the paper read this evening, is the expedition to Samodu, which was also a remarkable one, full of incidents. When I briefly state that he had to travel 400 miles through a destroyed country, not a single town or village left, the whole way strewn with bodies in every stage of decomposition to bleached skeletons, and on the return journey on which they were literally starving, having run out of everything, small-pox attacked his party, killing four, you will understand it was no mean undertaking. The history of Samodu so far as is known is a remarkable one, and I have chosen to tell you about him because we have heard a great deal of him, and I thought it would be of some interest to you this evening, more so than anything you can obtain about Sierra Leone from printed papers. He was sometimes described as the Mahdi of the West; he certainly was regarded as a prophet by a large number of his African Mohammedan followers. For years he has wielded immense power. He would appear to have been a Soninke or Malinke by birth, and was born about 1830 at Sonankoro in Konia, near the sources of the Niger. As a young man in one of the country wars he was taken prisoner, and became the slave of a powerful marabout named Fodé Mussa. He was very intelligent, and exhibited much intrepidity and audacity, and he was also a powerfully built man. Added to all this he showed great religious fervour, and acquired such influence in the household of Mussa his master, and over the chief men of the village, that Mussa became jealous of him and placed him in irons. He determined on revenge when he regained his liberty, which he did later on. His influence increased, and gathering about him many followers, he rebelled and proclaimed a divine mission. Enthusiasts rallied round him, and he seized upon the powerful Mussa and placed him in irons. From this time his power grew: he was invariably successful in his expeditions, and town after town came under his power and leadership. Nothing

succeeds like success; his marauding and conquering ramifications extended far and wide. He conquered the large district of Wassulau. He gained recruits from every quarter; small chiefs that were afraid of him voluntarily surrendered, and in self-defence placed themselves under his banner. He became a terror to all, and his influence extended far and wide, from towns on the right bank of the Niger to countries bordering on Futa Jallon. There was one particularly rich town he desired to possess, named Kemera, eastward of the Niger, occupied by a chief named Dagoba. Dagoba resisted, and sought assistance from the French. From that date up to the present Samory, as the French call him, may be said to have come in contact with that nation. It would appear he made some treaties with the French, which he is accused of repudiating, and for some years past he has been at war with them, endeavouring to stop their advance into his territory. I see by a recent account in the *Times* newspaper he lately met with a severe repulse from French arms at or near Segou, but that he personally escaped. His intention was, I believe, to carry war through the Limba and other countries adjoining Sierra Leone, right down to Port Loko; but this the Sierra Leone Government was evidently fortunate in stopping, through the timely and successful visits of Major Festing in 1887, who died on the return journey, and of Mr. Garrett, who has given us to-night an account of his journey to the country occupied by the Sofas, of whom Samodu was the head. The country and tribes surrounding Sierra Leone are full of interest; the latter are very numerous and frequently inclined to be troublesome, necessitating a continuously watchful and observant policy on the part of the Government with sometimes a resort to force. I do not know that I need detain you any further, but the two accounts in the paper to-night are to me full of interest. There are a great many minor points, but it appears to me that these two journeys are the most important.

The PRESIDENT: Mr. Griffith has supplied us with exactly that information which is required to bring into full relief the importance of the journeys performed by Mr. Garrett. Mr. Garrett has, I think, very great reason to be obliged to him; and we have very great reason, I think you will agree, to be obliged to them both. I see by your applause that you will instruct me to thank Mr. Griffith, and to thank Mr. Garrett also. I believe his son is present, and I trust he will convey to his father the pleasure he has given to the Royal Geographical Society by the account of his journey, which if it had any fault it was only this—that he did not say enough about his own achievements.

On Observations of Glacier Movements.

By M. DE DÉCHY, NON. CORR. R.N.G.S.

In a recent number of the '*Alpine Journal*' there appeared an interesting article upon glacier observations by Captain Marshall Hall, R.G.S. The author first describes shortly how things stand as regard actual observation of glacier advance and retreat in Central Europe; he then complains of the "sublime indifference" as to the history of glacial movements shown by travellers outside the "playground of Europe." Captain Hall mentions the numerous glaciers in British territory—in the Himalayas, in New Zealand, in the western portions of the British possessions in America—from which, "if there be records, probably no connected accounts exist." A large series of facts can easily be ascertained by every traveller, says the author further, and if this had been done for a very few years past in North

America, New Zealand, the Andes, the Himalayas, and the Caucasus, an excellent foundation for valuable results would have been laid.

Captain Hall's remarks are only too true, and we will hope with him, that with the extension of mountain exploration outside Europe the subject will receive adequate attention. It is true that if the exploration of the highlands of Central Asia and the ranges of western North America is to be thorough, "travellers must take with them some knowledge of glacial phenomena, they must be at the pains to acquire at least the rudiments of the mountain craft"—to quote the words of Mr. Freshfield in the Royal Geographical Society's 'Hints.' It has been the absence of these qualifications that has prevented many in other respects excellent travellers from advancing our knowledge of the mountain ranges they visited in any but a purely topographical sense.

For the present I wish only to give, after a short mention of some easy methods to be followed in glacier observations, some records made by me during my Caucasian travels, and to invite future visitors to these mountains to continue these observations, which may lead to the tabulation of useful data. I will only refer here to such observations regarding advance and retreat, increase or diminution of volume in the ice, as are likely to correspond with and to supplement my own observations. Leaving out of question elaborate trigonometrical methods, such, for instance, as have been carried out on the Rhone Glacier in Switzerland, the following plan gives very valuable results, and demands no other instruments than a small jar of paint, a brush, and a measuring tape. To ascertain the recent retreat of a glacier, measure the distance from the end of the ice in front of the longitudinal axis of the glacier to the most advanced terminal moraine, where vegetation first shows itself. The bare ground recently left by glaciers is easily recognisable. The diminution of volume is best measured by ascertaining the height of bare soil left on the sides of the lateral moraines in the portion of the glacier within the zone of vegetation. All photographic representations of the glacier end, and of the ground which has been freed from the glacier ice, are of great value.

It is very important to investigate the state of neighbouring glaciers, as regards advance or retreat, as it happens that neighbouring glaciers (see the Hintereis and Vernagt glaciers in Tyrol, the Asau and Terskol glaciers in the Caucasus) furnish very different results in this respect.

To examine the actual movements of glaciers, it becomes necessary to fix the actual state of the ice at the end of the glacier with the greatest accuracy, if possible at several places. Two methods can be employed for this purpose, which may be selected accordingly as circumstances are more or less favourable to either of them. Paint some signs on large boulders, not too far from the ice end, and measure their distance from it by a tape (Richter's system), or build a low wall of stones of a few yards in length and say 15 to 20 inches in height, some distance from the ice end, and measure this distance (Gossel's system). It is to be recommended that the stones of these walls should also be painted. Either of these methods is easy, and cannot be enough recommended to travellers in far mountain ranges. If the traveller himself returns after some interval—even after only two or three weeks—he will be able to judge of the movement of the glacier, and he will have laid down the ground for future observations by future travellers.

In 1885 I laid down some marks at the end of several Caucasian glaciers. These revisited in 1886 showed the following results:—

At the Cel Glacier of Adai Khokh group (wide valley of the Ardon) the boulders painted with the signs A, B, and D, showed a retreat of 23 feet, 15 feet, and 20½ feet respectively.

In the Upper Baksan Valley the glaciers Asau and Terskol descend from

the same reservoir of névé under Elbruz. The glacier of Asau is a glacier of the first order; the Terskol Glacier, although filling up the end of a small side valley, ends by a fall over a sudden break in its bed, and may be classed as a glacier of the second order. On the Asau Glacier, the wall built near the end was destroyed, the advance of this glacier was clearly shown by many evidences, and also the photographs taken from the same standpoint (indicated by paint) in 1885 and 1886. On the Terskol Glacier, on the contrary, a retreat not very great and hardly measuring 3 feet was proved. It may be noted that the Terskol Glacier has a steeper course than the Asau, and that steep glaciers move more rapidly in their oscillations than those the beds of which are less inclined: the Bossons Glacier and Mer de Glace are good examples.

On the Adish Glacier, under Tetnuld, valley of Ingur, Svanetia, a glacier of the first order, and descending in an extraordinary ice-fall, a wall was built in 1885 at the end of the ice, at distances of 8 feet and 18 feet. In 1887, two years later, when I visited this glacier in company with Mr. Freshfield, the wall was destroyed. Amongst the blocks, that marked E with paint, an enormous block measured in 1885, at a distance of 43 feet from the end of the ice, was found in 1887 at a distance from it of only 6½ feet. Thus a considerable advance was proved.

It would be very interesting if future travellers would look at these four glaciers, and, if possible, find my blocks, and measure their distances from the end of the ice, noting their marks, and address their results either to me or to the Secretary of the Royal Geographical Society, who will, no doubt, gladly publish them. All new observations on other glaciers, either in the Caucasus, the Himalayas, the Andes, or in Central Asia, should likewise be published, to promote a continuation of these observations and a registration and connection of the results gained, very important ones regarding the history and actual state of glacier phenomena in the mountain ranges of the whole world.

M. Jukoff, of the Russian Survey, has also measured (see 'Proc. R.G.S.' for February last, p. 111), several of the Caucasian glaciers, and thus furnished a further basis for future observers.

*A Journey in Benin.**

By HIS EXCELLENCY GILBERT T. CARTER, C.M.G., Governor of Lagos.

WITH reference to the brief notice of Governor Carter's discoveries in Benin, in our May number ('Proceedings,' p. 321), the following extract from a despatch by His Excellency to the Colonial Office, kindly forwarded to the Society by Lord Knutsford, acquires special interest. The journey extended from Lagos to Ondo and Ilesha. The Governor writes as follows:—

"It may be said that the whole of the country between Makun and Ilesha is one vast forest, with hardly a town of any consequence to relieve the monotony of the journey. The so-called "road" is merely a forest track of the narrowest description, in which a hammock is seldom

* The journey may be followed to some extent on the map accompanying Mr. Millson's paper, in 'Proceedings,' 1891, p. 644.

of any use. The heavy rains wash out deep ruts, leaving a network of roots, over which the pedestrian has to stumble the best way he can.

"The country was fairly level until we reached Morun on February 14th (1892), a small settlement containing about a dozen huts; after leaving this place, it was more or less hilly the whole way to Ilesha. On the 15th the road lay over a huge granite hill, whose summit my barometer gave to be over 500 feet above the sea. Here we saw traces of elephants. On the following day we ascended another rocky plateau, and for the first time since leaving Lagos we could see something of the surrounding country, which consisted of a series of rocky hills, wooded, however, to their summits. Where we stood there was an enormous mass of solid granite several acres in extent; but notwithstanding the absence of soil, I noticed a huge cotton tree whose roots spread all over the rock. There was a fine hill in close proximity, bearing S.S.E., which must have been quite 1000 feet above the sea. On the same day we crossed the Oluwa River, which is about 60 feet across—not 150 feet, as given by the Commissioners. It is a fine stream, and I was surprised to find no town on its banks. The bed of this river, as, indeed, those of all the streams we crossed, looked as though it was strewn with fine particles of gold. This I found to be due to the prevalence of quartz and micaceous schist. I am inclined to think that if the Ondo country were properly explored, gold would be found in it.

"The Oluwa was crossed again on February 17th, near Ondo, but here it was much narrower. In the official map this river is said to rise in the Ilesha country, but I ascertained definitely that its source is close to Ode On'o, just above the town. This river comes out into the lagoon near Arogbo, and I am told for some distance from its mouth is a very fine stream, with considerable depth of water. The river, which Captain Speeding records in his map as the problematical Oluwa, is evidently the Oni, which, I learnt, is a large stream near Oke Igbo, containing numbers of hippopotami and crocodiles.

"The town of Ondo is large, and well situated on a plateau about 750 feet above sea-level; the streets are wider and better laid out than in most native African towns with which I am acquainted. The houses are constructed of clay, and some of them are large and commodious, having verandahs supported by rudely-carved wooden pillars. The roofs are most elaborate, consisting of a veritable network of long poles ingeniously fastened together, and thatched with the leaf of a broad-leaved plant, the stems of which are also used for making mats. I ascertained that the Ondos inflict capital punishment both for murder and theft.

"The only town of any consequence between Ife and Ondo is Igbinde, which may possibly contain 600 inhabitants. This appears to be a centre for elephant hunting, and we saw numbers of skulls, which are preserved by the hunters and are regarded as "fetish." On

the homeward journey I witnessed a curious ceremony performed amongst these skulls by some hunters who were propitiating their fetish, prior to a projected elephant hunt. Several persons assembled round the skulls chanting a weird kind of refrain, and leading a dog, which, I noticed, was in excellent condition. The animal was intended for sacrifice, and afterwards to be eaten; hence the choice of a fat dog.

"The highest point reached during the journey was the summit of a hill between Iperindo and Ilesha, where I calculated we were about 1450 feet above the sea. I may mention that my calculations of heights were made with a compensated aneroid, which, I believe, is as accurate as such an instrument can be."

[Mr. Carter then goes on to refer to the mountain about which we published a note in the 'Proceedings' for May, p. 321].

"It only remains for me to say that at every town I visited in Ondo and Ilesha I was received with the utmost kindness and courtesy. The expedition went off without a hitch of any kind. There was no sickness amongst the Houssas, or carriers, and Mr. Stallard and myself enjoyed the most perfect health, although there was rain every day on our homeward journey from Ilesha; and camping on wet ground in West Africa is hardly conducive to the health of a European. I never saw a snake, nor was troubled by noxious insects, during the whole journey, and the nights were always cool. At Ilesha one morning the thermometer registered 64°, and Mr. Phillips informed me that at Ondo hailstorms are not uncommon in the month of August. No doubt they occur also in Ilesha, which is considerably higher than Odo Ondo. It is lamentable to see a splendid country like this practically a desert. The vegetable riches of such a region must be incalculable. I saw numerous species of rubber trees and vines, gums, and of course an inexhaustible supply of valuable timber. It goes without saying that a soil which could support this luxuriant growth must be extremely fertile, and coffee and cocoa would, I am sure, repay cultivation. The country is intersected by numerous small streams, and even at the very height of the dry season we could always get good water. The beds of the streams being all rocky and sandy, the water is singularly clear and pure, and I drank it without hesitation unfiltered."

The Mother Maps of the United States.

MR. HENRY GANNETT, in the 'National Geographic Magazine' for March 31st, 1892, gives a concise summary of the relative value of the "mother maps," from which general maps of the United States are compiled. Government surveys have been carried out by several departments, but cover only a small area. The most important is the

Coast and Geodetic Survey, commenced in 1832, which includes the whole coast-line of the Atlantic, Pacific, and Gulf of Mexico (Alaska excepted), and from which maps of a zone within five miles of the coast have been constructed on the scale of 1:10,000, or about 6 inches to a mile. The total area surveyed in this way is 34,000 square miles. The *Geological Survey* includes, as a necessary preliminary for most parts of the country, a topographical survey, which was commenced in 1882, with the prospect of ultimately covering the whole country. The maps of this survey differ in completeness and detail, but are inferior on account of the conditions of working to those of the *Coast and Geodetic Survey*. They are being published on two scales, 1:62,500, or about 1 inch to a mile, and 1:125,000; they indicate relief by contour lines. Culture, drainage, and relief are printed in separate colours from copper plates. As yet 550,000 square miles have been surveyed by this department. The *United States Lake Survey* have accurately mapped the shores of the Great Lakes and of the St. Lawrence, connecting with the other surveys by chains of triangulation at several points. *Engineer Surveys* have been made for Government on several navigable rivers, and the work on some of these, notably the Mississippi and Missouri survey, is of a high order. *Army Explorations* by traverse surveys based on compass bearings, supplied data for the earlier maps of the far west, but most of the areas have now been accurately resurveyed. A *Survey of the Fortieth Parallel*, begun in 1867 and finished in 1871, took in a strip 100 miles wide, embracing an area of 87,000 square miles. It is published on the scale of 4 miles to an inch, with approximate contour lines 300 feet apart. In 1869, a system of *Surveys West of the Hundredth Meridian* was commenced, but this was discontinued ten years later after about 360,000 square miles had been somewhat roughly laid down. One-third of the area was published in maps on the scale of 4 miles to an inch, the remainder on the scale of 8 miles to an inch. The *Hayden and Powell Surveys* took in about 167,000 square miles of the western territories, and were discontinued in 1879. The published maps are on the scale of 4 miles to an inch. *Boundary and Public Land Surveys* have been made by the general Government for the purpose of fixing State boundaries, and of dividing up the unappropriated land into townships and sections by meridional and parallel lines. The maps drawn from these surveys are intended only for the special purpose indicated, and are of little or no value for fixing the positions of features in the general topography. *State Surveys* have been inaugurated here and there, but rarely carried out in a satisfactory manner. In almost all instances the measurements rest on the *Coast and Geodetic Survey* bases, and in several the work has been finished by the *Geological Survey* of the United States. *Private Surveys* of a very rudimentary kind are responsible for the county maps of most of the States. These may be characterised as mere diagrams of the roads. The railway companies

have as a rule compiled maps of their lines, and profiles from which the configuration of the surface may be gathered. The Northern Pacific Company actually surveyed 43,000 square miles contiguous to their line in a manner comparable with the Hayden survey. It is remarkable, and to a British reader scarcely credible, that in the States of New York and Pennsylvania, except along the coasts and in some small isolated areas, there are no data for map-making, except the road and railway diagrams which make no pretence to accuracy.—Mr. Gannett summarises the result of his investigation by pointing out that the surveys, so far completed, would only permit of 100,000 square miles (one-thirtieth of the area of the United States excluding Alaska) being mapped on the scale of 1 mile to an inch. In addition, 360,000 square miles could be mapped on the scale of 2 miles to an inch, and 460,000 square miles more on the reduced scale of 4 miles to an inch. On the scale of 1:1,000,000 (or about 16 miles to an inch) suggested by the Berne Congress for the general map of the world, it would be possible to delineate 2,800,000 square miles or 92 per cent. of the area of the country, excluding Alaska. The 8 per cent. which cannot be shown even on this modest scale comprises Northern Maine, the Adirondack Plateau of New York, Southern Florida, most of Idaho and much of Montana, the Cascade and Coast Ranges of Oregon and Washington, western North Dakota and South Dakota, western Texas, and south-eastern New Mexico.

Exploration of the Black Sea.

In a communication to the Odessa Society of Naturalists, published in its 'Memoirs' (vol. xvi. fasc. 2), Dr. Ostroumoff gives a preliminary report on the fauna of the Black Sea, based on the explorations which were carried on last summer on board the war-sloops *Donets* and *Zaporojets*, and the schooner *Kazbek*.* The researches of the expedition confirm the hypothesis of Edward Forbes, according to which the Black Sea was formerly part of a wide brackish Aral-Caspian basin, which became connected at a recent epoch with the Mediterranean. The salt-water Mediterranean species must have penetrated into the Black Sea since that time, spreading from the west, and compelling the previous fresh-water and brackish-water inhabitants of the sea to retreat to the mouths of the rivers. The explorations also confirmed the remarkable fact of the total absence of animal life at depths exceeding 100 fathoms. Samples of mud from greater depths, when examined under the microscope, proved to contain no traces whatever of living organisms. They only contained

* The hydrographical results of the same expedition, by Captain Spindler, have been analysed in 'Proceedings,' 1892, p. 122.

skeletons or parts of dead organisms. The mud of great depths is usually covered with a deposit of carbonate of lime, and sometimes with a black crust of sulphide of iron. A deposit of red iron oxide is frequently found upon the mud and shells brought up from less depths. In May the upper zone of the water, in which life exists, may be roughly divided into three layers. In the superficial layer down to 25 fathoms, the temperature rapidly decreases from the surface until the temperature of 46° F. is reached. The second layer is that of minimum temperature (46° to 44°·6), which extends from 25 to 40 fathoms, and in the lower layer down to 100 fathoms the temperature slowly rises from 46° to 48° F. The last-mentioned layer was characterized by the abundance of full-sized Copepods; the middle one, by its richness in *Sagittæ*, while the lower parts of the upper layer contained numbers of Ctenophores (*Hormiphora*, *Pleurobrachia*), Appendiculariæ, and the medusa *Aurelia aurita*. The lower limits of organic life are determined by the abundance of sulphuretted hydrogen in the water, as known from previous exploration,* and also to some extent by the configuration of the bottom. A characteristic representative of the fauna of the greater depths (70 to 90 fathoms) is the little Crustacean *Apsodes* (the species is named *cæcus* by the author), which has lost its eyes, and has instead two slightly translucent buttons. The Mediterranean Holothurian, which was discovered last year by Mr. Andrusoff, opposite the Bosphorus, undoubtedly is an immigrant from the west. It is also quite common along the Anatolian coast at depths below 50 fathoms, and it has been found twice (70 fathoms) off the south coast of the Crimea. In its migrations in the Black Sea, it must have derived an advantage from its easy accommodation to life in less salt water. The south-western part of the Black Sea, off the Bosphorus, is rich with species which have immigrated from the west. The preliminary results of the chemical analyses of water at different depths, which are published in the same volume, by the chemist of the expedition, A. Lebedintsoff, are also very interesting, although a considerable time will yet be required to complete the analyses. As the result of analyses at fifty-seven stations, one litre of water (at normal temperature and pressure) was found to contain gaseous sulphuretted hydrogen in solution in the proportion of 0·33 cubic centimetres at 100 fathoms, increasing to 2·22 cubic centimetres at 200 fathoms, and no less than 6·55 cubic centimetres at the bottom. The salinity of the water was determined by the chemical method at 140 different stations. It appears that the water of the Sea of Azov contains, as a rule, only one-half the amount of combined chlorine found in the superficial layers of the Black Sea, namely, from 5·32 to 6·02 grammes per litre of water, and that this amount

* 'Proc. R.G.S.' 1890, p. 191.

varies very little with the increase of depth. In the Black Sea the amount of chlorine varies, in the superficial layers, from 7·6 grammes off the Danube to about 10 grammes elsewhere. At a spot where the lower current of salt Mediterranean water is supposed to flow in from the Bosphorus, the amount of chlorine was 9·81 grammes per litre. The salinity increased gradually to 11·65 at 30 fathoms, and then abruptly to 19·30 at 40 fathoms, where the water was as salt as that of the ocean. The amount of organic matters contained in the water also increases with increasing depth. From the geographical point of view such preliminary conclusions as may be drawn are of value, because they show how closely physical researches bear on the origin of the existing distribution of land and water. They throw light on that border-land which the geologist cannot enter from his side, and to which the historical geographer cannot reach back from ours. In this scarcely-touched department of synthetic research it is not too much to hope that the origin of many of the events of history may ultimately be found.

*Rev. E. O. MacMahon's Journeys in Western Madagascar.**

ALTHOUGH the interior of Madagascar is now much better known than it was twenty years ago, there still remain extensive portions of the island, especially of its western side, which are practically unknown to Europeans, and whose inhabitants are as yet untouched by western civilisation or by Christianity. One of these western tribes, the Betsiriry, one of the numerous races known to other Malagasy and to foreigners by the common name of Sakalava, has recently been visited by an English missionary, the Rev. E. O. MacMahon, of the Anglican Mission in Madagascar. These people inhabit a part of the western plains at about the central portion of the island, between S. lat. 19° and 21°. Mr. MacMahon's first journey was commenced in May 1888; starting from his station at Ramboandro, some 60 miles distant, west of Antananarivo, on the 21st of that month, he passed for three or four days over the bare moors of the central plateau; and then, as he descended to the extensive western plains, traversed for nearly a week a more fertile country, "with no lack of wood, as many of the valleys are full of trees and running water." Here wild oranges abounded, with occasional forests of palm. The route was only known for a part of the journey by a young Hova who acted as guide to the party. After crossing two ranges of mountains, they came at length, after nine days' journey, to the Betsiriry territory; between these two ranges—the Bongolava to the east, and the Bamaraha to the west—two large rivers unite and thence flow into the sea. The northernmost of these is the Mahajilo, and the southernmost the Mania, the united stream being known as the Tsiribihina; the former of these rivers is said to be "as large as the Thames at London Bridge," and the latter is considerably larger. The first native met with is described by Mr. MacMahon as having "no clothing beyond a waistband round his loins, but he made up for this defect by paint and weird ornamentations, such as crocodiles' teeth, chains, and beads disposed around his head and neck. His hair was done up in large knobs." At first scant courtesy was shown to the

* By the Rev. James Sibree.

strangers, but eventually the chiefs behaved in a more friendly way, as they became convinced that their visitors had no ulterior objects in view, and had not come as spies from the Central Hova Government. Several of the minor chiefs showed some interest in the objects of the visit, and one of the most influential of them, named Ilibikibobo, begged Mr. MacMahon to return soon and to come and live among them, the former of which requests he promised to comply with. He was unable to see the king, a young man named Itoera, who is said to be able to put 12,000 armed men in the field in time of war. The Betsairry do not use the "cut money" employed in most parts of Madagascar, and will only accept whole dollars; and they employ as barter, beads, pictures, coloured handkerchiefs, powder, shot, ornaments, brass beads, and chains, &c. The Arabs are the chief importers of such articles. Mr. MacMahon returned to Imérina by a more northerly route, and reckoned that from his station at Itanainandro to the further point he reached was about 150 miles in a straight line, and that he had travelled in the whole journey, to and fro, about 400 miles. He did not reach the sea, which was still a day and a half's journey further west, down the Tsiribihina river. Mr. MacMahon, according to his promise to the Betsairry chief, set out again from his station in the month of October in the same year, to make a second visit to the people he had seen in the previous June. A few more geographical particulars are given in his account of the second journey, but they are very meagre, and no map (except one of the smallest scale) is given of the route. On October 2nd, a Hova garrison station, Fidirana, was reached; on the 3rd, a rapid stream, the Makoa, not marked on the map, was crossed, as well as several streams running north into the Sakay river, the camp being made near Mount Ihasy; and on the 4th, they crossed the Izhimainty river, a large stream, and slept on the banks of a swift stream called Ambatotsiphina. On the 5th, says Mr. MacMahon, "we got to the terrible Ambaldirana pass, in the Bongolava mountains. There is a small but swift stream, which has literally sawn its way through the mountains; the sides of the pass are almost perpendicular for hundreds of feet, and the road, about a span wide, runs along the side of one cliff, and then down into the stream, which is almost hidden in thick foliage." On the 8th they passed a large river called Ambatokazo; and two days later they arrived at the settlement of the chief Iankavalo, coming to that of Mosbato, Ampanapahankazo, on the following day. Other chiefs, north of the Tsiribihina, were afterwards visited, with the result, as already stated, of the party being refused permission to place Christian teachers among their people. Mr. MacMahon does not appear to have had any instruments with him for mapping, even in a sketch fashion, his routes to and from the west; and so the geographical results of his journeys are small, a fact to be much regretted, as there are many interesting points in the physical geography as well as the geology of this portion of Madagascar on which more exact information is needed. It is to be hoped that any future traveller by this route will furnish himself with appliances for adding to our scientific knowledge of this part of the island. Mr. MacMahon confirms the previously reported existence in this part of Madagascar of a tribe of people, very low in the scale of humanity, called Behasy, who are said to live in the trees and in caves, and to have a growth of hair all over their bodies, and to be short in stature. How far all these reports are true, it is difficult to say, but it seems all but certain that there does exist a remnant of some aboriginal race in these regions of Madagascar. Reference is made by Mr. MacMahon to the numerous slaves held by these Sakalava tribes, who have been stolen from the central provinces of the island in the numerous marauding raids made during the last few years into the settled districts. These poor people, Hova and Betsilé, endure terrible sufferings in their enslavement by the barbarous western tribes.

GEOGRAPHICAL NOTES.

The Medallists of the Geographical Society of Paris for the Year 1892.—

At the meeting of the Geographical Society of Paris, held on May 6th last, the various medals and prizes for the current year were distributed by M. E. Levasseur, of the Institute, a Vice-President of the Society. The following were the awards:—1. Grand Gold Medal to M. Élisée Reclus, for his well-known work entitled, 'Nouvelle Géographie Universelle'; 2. Gold Medal to the Prince of Monaco, for his scientific voyages in the yacht *Hirondelle* (1885–1888); 3. Gold Medal (Lagerot Prize) to M. A. Pavie, for his explorations in Indo-China (1890–91); 4. Gold Medal (Léon Dewoz Prize) to M. J. de Morgan, for his travels in Persia and Kurdistan (1889–91); 5. Gold Medal (Louise Bourbonnaud Prize) to M. Henri Coudreau, for his ten years' exploration of Upper French Guiana (1881–91); 6. Gold Medal (Conrad Malte-Brun Prize) to M. Alfred Fournou, for his explorations in the French Congo region (1886–91); 7. Silver Medal (Alphonse de Montherot Prize) to M. C. H. Pobéguin, for his surveys in the French Congo district; 8. Silver Medal (Ch. Grad Prize) to M. A. Chélu, for his description of the Lower Valley of the Nile; 9. Pierre F. Fournier Prize for the map of Indo-China prepared by the Pavie Mission. In addition to the foregoing, a Grand Gold Medal was awarded to M. Charles Maunoir, the General Secretary of the Society, in respect of his twenty-five years' work in that capacity.

Traveller's Equipment.—The 'Alpine Journal' for May publishes the report of a special committee on Equipment for Mountain Travellers. Part I., dealing with ice-axes, ropes, and clothing, is of special interest to mountaineers only; but Part II., containing much practical advice on camping out, has value for all explorers. The report not only tells exactly what equipments should be used, but gives a list of firms from whom they can be procured. Hints as to the best form of tent for "heavy camp" and "light camp" sum up the results of much practical experience; and in the latter, portability seems to have reached a maximum, tent, sleeping-bags, and tent-floor for three men weighing only twelve pounds.

European Time Standards.—On May 1st Greenwich time was adopted on all the railways of Belgium, and on June 1st in the Netherlands, as another step towards putting the time standards of Europe on as simple a footing as those of America. Austria-Hungary, Germany (in part; the whole empire will conform in 1893), Luxemburg, Servia, Western Turkey, and Sweden, have all adopted as a uniform railway time that of 15° E. longitude, one hour in advance of Greenwich. Russian railway time (that of Pulkova, 30° 19' 40" E.) is so nearly two hours in advance of Greenwich, that it may almost be taken as that of the second

hour interval, to which Rumania and Eastern Turkey also conform. Hence, it is probable that before many years three standards of time, differing by one hour each, will serve for the railways of the whole of Europe, and in the course of time come to be adopted for other purposes as well. (See De Busschère, in the 'Bulletin' for March-April of the Société Royale Belge de Géographie, and the *Mouvement Géographique* for May 1st, 1892, where a map is given.)

Area and Population of European Countries.—M. E. Levasseur, in a communication to the Académie des Sciences on March 21st, 1892, calls attention to the diversity usually to be found in statistics of area and population in standard works of reference. Considering only such high-class publications as *Die Bevölkerung der Erde*, the *Almanach de Gotha*, and the *Statesman's Year-Book*, he points out that diversity does not necessarily convict any of error, as the approximation to the exact figures may be arrived at in different ways; that, in fact, absolute agreement in statistics is a sign that they have been copied by one writer from another. In some cases the areas of countries are officially derived from cadastral surveys, which, as a matter of fact, often do not include the whole land and water area of a country, geographers not being agreed as to what water areas should be reckoned along with the land. In other cases official or semi-official measurements are made on large-scale topographical maps, and the degree of approximation must vary with the scale, and with the technical skill of the computer. Some countries are content with measurements or estimates made by individuals, such as those of Stralbitsky, and of Perthes' Institute. The calculation of population is still more uncertain, being dependant on census returns (themselves imperfect), calculated to any given intermediate date by estimates derived from registers of births, deaths, immigration, and emigration. In a table brought down to the end of 1890, M. Levasseur gives a conspectus of the area, population, and density of population of the countries of Europe, classed in four groups, as follows:—

		Inhabitants.	Area, sq. miles.	Density per sq. mile.
Western Europe	.. ..	87,100,000	352,300	247
Central "	.. ..	93,608,000	461,400	209
Southern "	.. ..	71,826,000	557,800	130
Eastern "	.. ..	98,000,000	2,106,500	47
Northern "	.. ..	9,100,000	378,000	23
All Europe	.. ..	359,635,000	3,859,200	93.1

Notes as to the various estimates of area are appended; those relating to the German Empire may be cited as an example. The *Bevölkerung der Erde* in 1872 gave the area as 207,116 square miles; in 1871, as 207,935; in 1876, as 207,943; in 1878, as, in 1880, as 207,883; in 1882, as 207,899; in 1891, as 207,891; while Stralbitsky's measurement is 208,008; and that adopted in the tables from the *Statistisches Jahrbuch für Deutsches Reich* for 1891 is 207,929 square miles.

The Katavothræ of the Morea.—M. E. A. Martel, whose researches into subterranean geography have been recognised by a medal from the Paris Society of Commercial Geography, has recently investigated the remarkable features known in Greece as katavothræ. In the 'Revue de Géographie' for April and May he describes his preliminary explorations and the more detailed efforts of M. Siderides, which are still in progress. The Morea contains a number of enclosed drainage areas entirely surrounded by high land, and subject to occasional floods. Marshes are consequently

formed, making the neighbourhood almost uninhabitable from the prevalence of fever. M. Martel gives a map of the peninsula showing twelve such isolated basins, seven of which are clustered together on the central plateau. Tripolis is situated in the largest. All these basins are drained by underground channels, to the entrance of which the name *katavothra* is given. The formation of marshes is due to the natural outlets becoming choked by wood or maize-stalks, carried along by the flood waters. A study of the relative altitudes of the *katavothra* and the sources of the Alphæus, showed that the sink of Taka could not possibly be the origin of that river, as has hitherto been believed. At first the descent of the Taka *katavothra* was easy. It opened at the side of the marsh, 2155 feet above sea-level, and formed a gallery descending at an angle of 30° , 6 feet wide, from 6 to 20 feet high, and without stalactites. At a distance of about 150 feet there was a cross-road about 100 feet below the bed of the marsh. The galleries to right and left were large enough to traverse, but proved to be *culs-de-sac* containing deep pools, which contained a thick sediment of fetid mud. In front was a hole, 10 inches in diameter, through the solid rock, and this formed the sole outlet. The narrow outlet was subsequently enlarged by dynamite, and access obtained to a pit and gallery, which led to a depth of 150 feet below the level of the marsh. The wider opening improved the drainage of the valley so much that no marsh was formed by the autumnal rains, although in spring a slight overflow occurred. By constructing canals leading from the mountain torrents direct to the sink, and still farther widening it, the region will probably be rendered dry and perfectly healthful. The *katavothra* of Verzova opened as a cavern 16 feet high, and wide, at the base of the mountain, into which the Saranda Potamos river is conducted by an artificial canal at an altitude above sea-level of 2083 feet. A steeply sloping gallery 115 feet long leads to a vertical well 23 feet deep, which opens into a fine chamber 60 feet long, 20 feet wide, and 65 to 100 feet high. In the floor a well 2 feet wide and 36 feet deep conducts to a steep gallery 164 feet long, which widens into a cave (65 feet long and 32 feet high) hung with stalactites. In the floor opened a third well 2 feet 6 inches in diameter and 60 feet deep, which was the limit of the exploration made by M. Siderides, the farthest point attained being 391 feet from the entrance horizontally, and about 262 feet below the level of the plain. The outlet of this drainage system is undoubtedly at the spring of Benicovi, 3 miles east of the *katavothra* and 1100 feet lower. From the outlet M. Siderides was only able to penetrate 130 feet on account of the current escaping, but he is confident of being able to make the whole journey underground in dry weather. The regulation of floods and drainage of marshes by keeping the *katavothra* open is not new, but the present efforts by blasting the internal constrictions of the outlet promise to be more effectual than any measures hitherto tried.

Ice Cavern in Eastern France.—The 'Comptes Rendus' (vol. cxiv. p. 1222), describes the descent of the "unfathomable" abyss called the *Creux-Porcé*, near Dijon, by M. E. A. Martel. At an altitude of 1560 feet on the Plateau of Langres, the *Creux-Porcé* opens as a perpendicular shaft in jurassic limestone, 130 feet by 65 feet on the surface. The total depth was found to be 180 feet, and from a constriction about two-thirds of the way down there hung sheets and columns of pure transparent ice, clearly illuminated by daylight. The temperature at the bottom on March 28th was 28° Fahr., and in the open air at the orifice 58° . The fact that the pit lies at the mouth of a valley may partially explain the low temperature which persists in its depths.

An Iceberg in the Alps.—A short distance above Landeck the Inn receives from the right the waters of the Faggenbach, flowing through the Kaunsersthal, in the Oetzthal group. In this valley, about 4 miles from its junction with the Inn, is situated the village of Nufels. The high road here crosses the side valley of the Nufser, or Gallrutbach, which has its source in the great heap of rocky *débria* at the foot of the Gallrut glacier. This valley was in the summer of 1890 the scene of an interesting glacial phenomenon, which may be compared to what is known as the "calving" of glaciers in the polar regions. The catastrophe of August 7th, 1890, which did such serious damage in and about Nufels, was really quite an ordinary phenomenon, being nothing more or less than the sudden outpouring of a moraine lake. The circumstances, however, which led to this event are extremely interesting and peculiar, having been witnessed in the Alps only once before. The Gallrut glacier had receded of late years, and a lake had been formed at its foot; the end moraine had been strengthened by falls of rock from the *Trostkopf*, which bounds the glacier on the east. The lower end of the glacier seems to have been deprived of the support of the ground moraine by the action of the water even before the lake was formed, and gradually the lake extended farther under the glacier, until, as the glacier advanced, it at last almost covered the lake. July and August, 1890, were comparatively cool, and the lake received but a scant water-supply from the glacier. The surface sank until at last the end of the glacier was actually hanging in the air above the lake. The catastrophe was now hourly to be expected, and at midnight of August 7th it came. The end of the glacier, a mass of ice estimated at 70,000 cubic feet, broke off and fell into the lake, causing it to burst through the embankment and rush down the valley, carrying with it masses of mud and rock.

The Mean Level of the Seas of Europe.—Dr. A. Supan, in a recent number of 'Petermann's Mittheilungen,' calls attention to the fact that, according to the most recent measurements, particulars of which have lately been published, the old hypothesis that there were important differences in the levels of the seas of Europe is no longer tenable. The statistics given in the 'Bulletin Annuel de la Commission de Météorologie du Département des Bouches-du-Rhône' (1891), show that the heights of the water at 38 stations in the Adriatic, Mediterranean, Atlantic, Channel, North Sea, and Baltic differ in most cases but a few centimetres from the height at Marseilles, so that, for practical purposes, it may be taken that the sea-level on all the coasts of Europe is the same.

Mr. Conway's Expedition to the Himalayas.—The *Times* Calcutta Correspondent telegraphs that a letter, dated Gilgit, June 8th, gives some details of Mr. Conway's expedition. The party left Gilgit on May 11th, went up the valley at the head of which stand Rakaposhi and other great peaks. They discovered that the upper part of the valley contains some 120 square miles of glacier. This region was completely explored and mapped, and considerable botanical and geological collections formed. The weather was very bad, and snow fell almost daily. All the mountains, difficult at best, were often rendered totally inaccessible by continual storms and avalanches. The party climbed a difficult rock peak about 15,000 feet high, and another nearly 17,000 feet.

They ascended a pass 15,000 feet in height, the other side of which they explored. The party camped one night at a height of 15,600 feet, on a flank of a high peak overlooking Nagar, but were driven down by a heavy snowstorm. After three weeks of settled bad weather, brought by a constant south-west wind, they were forced to return to Gilgit. It was their intention to start on June 8th for Nagar by the valleys, en route for Askole, by the Hissar Pass. It is to be hoped that in July and August, the best mountaineering season in this region, the explorers will be less hindered by bad weather.

Dr. Ten Kate in the East Indies.—Dr. Ten Kate, the well-known ethnologist, has been for some time past travelling in the East Indies, visiting various islands. In a letter written in November last to Prince Roland Bonaparte, and communicated by him to the Geographical Society of Paris, he gives an account of his voyages since April. The most interesting part of his travels was his exploration of the island of Sumba (Sandalwood), where he spent two months and a half. The island has been up to the present almost a *terra incognita*. He landed at Waingapung, the seat of the Dutch Government, although the limits of its authority do not, according to Dr. Ten Kate, extend beyond this small miserable town. The Sumbanese are divided into certain "kingdoms," and are absolutely independent. They are a fine race. There are three or four distinct languages spoken. Although very numerous and sedentary, the Sumbanese may be described as "equestrian." They possess thousands of horses, of a small but fiery breed, great numbers of which are allowed to remain half wild. The people are continually at war among themselves, and their customs are barbarous and cruel. Their tombs are of the "dolmen" type, but there is great variety: many of the stones were found to be laboriously carved. In the course of an excursion through Massau, the magnificent central mass of the east, with its sacred places ("merapu") and dense forests, the population maintained a defiant and almost hostile attitude. After making a tour of the island from the east coast, the traveller marched to the south-west from Wagelu, and penetrated into an absolutely unknown territory, at times doubling immense cliffs, at others crossing promontories projecting far out into the sea, and exploring wooded and almost inaccessible mountains. The natives, after overcoming their timidity, became by degrees more friendly, and looked upon Dr. Ten Kate as a Java prince; they had never seen a white man. He finally traversed the island from south-west to north-east. The island is almost exclusively of coral rock and recent marine formations; only here and there are eruptive rocks found. The supposed volcano, shown on certain maps as near Tarimbang, has no existence. The coast-line of the south needs much alteration on the maps. There are no chains of mountains in Sumba, but only distinct and isolated groups, and great tablelands intersected by deep ravines like those of Texas. The forest vegetation is comparatively poor, but the prairies are very extensive. The climate is very variable. Mists are frequent, and the dew very heavy on the mountains. The fauna is poor, especially in mammals. Horses and rats are abundant. The only carnivorous animal which the island possesses appears to be a species of *paradoxurus*.

Rotti Island (Timor Sea).—The little-known island of Rotti, lying to the south-west of Timor, is described by M. Arthur Wichmann, of Utrecht, in a short article published in 'Petermann's Mittheilungen' (Part 6). The author paid a short visit to the island in the course of his travels in the Eastern Archipelago; but his

article contains a *résumé* of all that is known about the island and its inhabitants. Rotti is 51 miles long, and 16 miles broad at its widest part. The coast is much indented; the two largest bays being those of Ronggu and Korbaffo, between which lies the Landu Peninsula, shown on most maps as an island. A high ridge runs almost through the whole length of the island, ascending gradually from the north coast, then extending in a series of high grass-covered plains, and finally sloping precipitately to the south coast. On these plains are several lakes, which may be the remains of a former sea-covering; the natives assert that these lakes contain crocodiles. At certain points some good springs are found, but like north-west Timor, the island suffers severely from drought in the dry season. The lowlands of the north-west coast are only half a mile in breadth, and on the other side of the island they disappear altogether. The island is surrounded by reefs and rocky islets. In its climatic and meteorological conditions it resembles the adjacent part of Timor. The west monsoon sets in at the end of November or beginning of December, and lasts till April. From June to October no rain falls as a rule. The geological formation of the island is comparatively simple. Briefly, Rotti is an old triassic mass, which is covered over with more or less extensive recent deposits, consisting chiefly of coral limestones. M. A. Rothpletz states that the fossils found in the limestones are typical representatives of the upper Alpine trias, and from the fact that three of these varieties are found in Sicily and two in the Himalayas, he concludes that a mighty sea-basin, covering simultaneously Europe and the East Indies, existed during the triassic period. It is worthy of note that this Rottinesian trias fauna is not apparently related to the faunas of New Zealand, New Caledonia, and Japan. There is no trace of eruptive rocks on the island. The flora and fauna, so far as are known, differ but little from those of the south-western peninsula of Timor. The mountain slopes and high plains are covered with a thick growth of alang-alang—a tough grass which serves as food for innumerable buffaloes and horses. Here and there are large clumps of palms, the raw sap of which forms, during the months of April, May, and June, almost the only food of the poorer class of the population. Only a few patches of virgin forest are left. Rice, maize, and similar products, are cultivated. The natives differ in important points from the inhabitants of the neighbouring islands, although resembling them more closely than the Malays. The Rottinese have a less prominent nose, and smooth, flowing hair, and thus stand in strong contrast with the curly-headed races surrounding them. They are also far more intelligent and capable of development. Agriculture and cattle-breeding are the chief sources of livelihood; the former is in a very primitive condition. The population of the island numbered 52,809 in 1885. The map which accompanies M. Wichmann's paper does not profess to give an absolutely accurate representation of the island, but it corrects many mistakes in our present maps.

Captain Monteil's Journey to Kano.—The 'Politique Coloniale' publishes a long letter, written by Captain Monteil from Kano to a friend in France, which, as indicated last month ('Proceedings,' p. 413) was sent by an Arab caravan across the Sahara to Tripoli. He reached Waghadugu on April 28th, 1891, and travelled northward through Bussoma and Ponsa to Liptaka, through a country devastated by a cattle plague, which cut off his means of transport. In the difficulties which here befel the expedition, Monteil found great help in his faithful subordinate Badaire. Liptaka was in a state of anarchy consequent on the death of the king and the rivalry of three aspirants

for the throne; but the explorers met with a good reception in Dore, the capital, a large commercial town trading with Timbuku, and a noted salt market. Having procured beasts of burden, they turned south-eastward to Zappa, capital of the Yaga country, where sickness, and the loss of cattle and horses, reduced the expedition to great straits; but by July 19th they had struggled on to Torrodi, whence, with fresh cattle presented by the friendly chief, they reached Say, and rejoined the Niger, which they had left at Segu, ten months before. Say did not appear to have much importance as a trade centre, few European goods being found. The king was extremely friendly; but Monteil declined his pressing invitation to rest for awhile, and at the end of August crossed the Niger, and pushed on straight through a region peopled with predatory tribes, past Dosso, the capital of Guerna, Giduac, and Torso, to Argungu, the capital of Kabbi, a strong town 80 miles from Sokoto. In one instance the audacious thefts by the natives had to be resisted by force. In the middle of October Sokoto was reached, and found reduced to great poverty by the cattle-plague, with no sign of trade. The Sultan is said to have welcomed his French visitors enthusiastically. A farther march of twenty days brought the expedition to Kano, which was reached on November 25th; and here a long halt was made, Monteil being on the point of setting out on the last 370 miles to Lake Chad when he wrote on January 6th, 1892, and he was confident of returning to Europe by the end of the year. Kano, Monteil states, is a much more important town than Sokoto. It contains large square houses built of dried mud, and is surrounded by a strong wall 26 feet high. It is a trading centre of great value, Arab caravans coming to it from Constantine, Tunis, and especially Tripoli. Captain Monteil studied the resources and routes of the countries passed through. He believes that the whole commerce of the great curve of the Niger should be secured to France by obtaining access to the chief market towns, but the first essential is to open a waterway from Segu to Say, even postponing for this purpose the effective occupation of Timbuku.

Emin Pasha's Expedition to Lake Albert Edward.—The June number of 'Petermann's Mittheilungen' contains a preliminary report by Dr. Stuhlmann of the expedition of Emin Pasha to the Equatorial Lakes. Much good geographical work has been done, and many blanks filled up. The course of the Ituri has been rectified on the maps, and important discoveries have been made as to the watershed between the Congo and Nile basins. A full discussion of the new information will be published in next month's 'Proceedings.'

The "Shotts" of Algeria.—A short excursion in the region of the Algerian "shotts," made in the spring by M. Vuillot, a sketch of which appears in the 'Comptes Rendus' of the Geographical Society of Paris

(1892, p. 242), has added to our knowledge of this still little-known region. From the oasis of Tozeur to Ashana his route followed that of Commander Roudaire; but from the latter point he took a west-south-westerly direction, and traversed a series of "shots," which are more or less directly connected with the Melrir, and the position of which had only been known from native reports. He finally arrived at El-Awina, on the route leading to the Wed Suf, at the south-eastern extremity of the "shot" Bejelul, and thence returned to Biakra. The entire route was surveyed. One interesting result of M. Vuillot's observations is that there are certain points between Sif-El-Ashana and El-Awina which are above the level of the sea, whereas Commander Roudaire has *a priori* placed the whole of this region below sea-level.

The Milanji Mountains, in Nyassaland.—In a recently-published Parliamentary paper, containing communications from Mr. H. H. Johnston relating to the suppression of slave-raiding in Nyassaland, there is a letter from Mr. Whyte, giving an account of his exploration of Milanji. Mr. Whyte went out with Commissioner Johnston to Nyassaland, and spent a fortnight in the end of October last year in exploring the mountain and district of Milanji, and in collecting specimens of the flora and fauna. Milanji he describes as "an isolated range of precipitous mountains, the main mass forming a huge natural fortress of weather-worn precipices." It is the highest land in South Central Africa, and unless Mount Rungwa happen to be a few feet higher, it is the highest point between Natal and Kilimanjaro. The mountain mass is about 12 miles long by 8 broad; the plateau is nearly 40 square miles in extent, with an average elevation of 6000 feet. The estimated height of the mountain is 9800 feet. It lies wholly within the bounds of the British Protectorate. During Mr. Whyte's visit the mean temperature (at 6000 feet above sea-level), was 63°; while he estimates the annual rainfall at from 60 to 70 inches. Mr. Whyte thus describes the view from one of the highest ridges: "Looking westward, we saw beneath us the plateau of Milanji, with its rolling hills of grassy sward, belts of green forest, and numerous ravines and rivulets, all shaping their course towards the principal valley of the plateau through which the Lutshenya [Luchunya] flows. On the right hand are the main peaks of the mountain, rising directly from the valley of the Lutshenya, which runs parallel with its southern base. Across the table-land in the distance is the somewhat isolated and precipitous Tshambi [Chambi] Range, which is separated from the Milanji table-land by the gorge of the Likabula River. To the front and to the left we have a continuation of the grassy hills which encircle the plateau, and which are capped with rugged cliffs of granite and gneiss." The most striking botanical feature of the plateau is the large cypress; while it is noteworthy that the birds on the mountain differ widely from those found

at its base. Mr. Whyte concludes that Milanji would prove an excellent sanatorium if the means of access were improved.

Mexican Mountain Flora.—Professor Angelo Heilprin publishes, in the 'Proceedings' of the American Philosophical Society for January, 1892, a valuable paper on the temperate and alpine flora of the great volcanoes of Mexico. He finds that, excluding grasses and sedges, 199 plant species occur at or above 10,000 feet, while five pass beyond 14,000 feet. The Star Mountain (Orizaba) was most carefully studied, its snow-line occurring at 15,000 feet; but its flora was intimately connected with that of Popocatepetl, Ixtaccihuatl, and the Nevada de Toluca, all of which rise through a broad belt of pines to the common alpine flora. The vertical range of the pine in Mexico is very remarkable; the genus occurs as low as 4000 feet (well within the palm region), and as high as 14,000 feet, close to the perpetual snow. Although the genus *Pinus* does not occur on the Andes, the non-arboreal flora of the Mexican heights closely resembles that of regions with similar climate in the South American mountains. The various observations made still require to be generalised and extended before the difficult problems in geographical origins, which they suggest, can be solved.

The Harbour of St. Thomas, West Indies.—A correspondent of the Paris Society of Commercial Geography writes that St. Thomas has entirely lost its importance as a commercial centre in consequence of the adoption of Barbados as the island at which British steamers call for freight and instructions. In consequence the fine harbour of St. Thomas, formerly crowded with steamers, is now only visited by five or six sailing vessels in a month.

The Proposed Antarctic Expedition. Captain David Gray's projected whaling expedition to the Antarctic seas ('Proceedings' for April, p. 214) has broken down on account of the money subscribed for the enterprise falling short of the sum requisite for fitting out two vessels. The promoters declined to take the risk of sending a single ship, and the money has accordingly been returned to the subscribers.

Obituary.

Rear-Admiral Richard Charles Mayne, C.B., M.P.,* whose death occurred on the 29th ult., was the second son of the late Sir Richard Mayne, K.C.B., for many years Chief Commissioner of Metropolitan Police. He was born in the year 1835, and entered the Royal Navy from Eton, at an early age, on board the frigate *Inconstant*, Captain John Shepherd. Three years later he was appointed to the *Cumberland*, flagship of Sir George Seymour, on the North American Station. In 1854 he joined the *St. Jean d'Acre*, under the present Admiral of the Fleet Sir Henry Keppel, in which ship he served first in the Baltic, and afterwards in the Black Sea, during the Russian War; on being promoted to Lieutenant in 1855, he was appointed to the *Curlew*, in which vessel he was present during all the operations

* By Admiral Sir George H. Richards, K.C.B., F.R.S.

in the Sea of Azoff. For these services he received the Crimean medal, the Legion of Honour, and the Turkish War medal.

In 1856 Lieutenant Mayne was attached to the Nautical Survey of Vancouver Island and British Columbia, which was undertaken in connection with the settlement of the boundary-line between the British and United States possessions along the 49th parallel, and through the Strait of Fuca to the Pacific Ocean, generally known as the St. Juan question. During this service in Her Majesty's ships *Plover* and *Hecla*, Lieutenant Mayne conducted several exploring parties in the interior of Vancouver Island and the continent, for which, in 1860, he was promoted to the rank of Commander, and returned to England. Some account of the work was published in the 'Journal' of this Society, vol. xxii, p. 297, and vol. xxxii, p. 529.

In 1862 he was appointed to the command of the *Eclipse*, for service in New Zealand, and took a part in all the native wars of that period, until severely wounded at Rangirin, on the Waikato River, in November, 1863, which obliged him to be invalided home. For these services he was especially mentioned in despatches, and was promoted to the rank of Captain; and in 1867 received the Companionship of the Bath.

In 1866 it was decided by the Admiralty to undertake a re-survey of the Strait of Magellan, owing principally to the establishment of a line of large steamers by that route to the west coast of America, and the consequent necessity of bringing the surveys of King and Fitzroy up to the standard of modern requirements. H.M.S. *Nassau* was fitted out for this service, and Captain Mayne was selected to command her. He continued on this arduous and harassing duty until the year 1869, when the ship was recalled to England; and on the completion of the charts, the approbation of the Admiralty was conveyed to him and his officers for the manner in which the work had been carried out. During the *Nassau's* survey of these stormy and desolate regions, the first large vessel of the Pacific Mail Steamship Company, the *St. Jago*, was wrecked outside the Bay of Mercy, in the western entrance to the Strait, on a reef of rocks, which only a few days previously had been discovered by the surveying vessel herself grounding on it. The *Nassau*, being fortunately near at hand at the time of the accident, rescued the crew and passengers (nearly 200 in all), and conveyed them to Monte Video.

In 1870 Captain Mayne married Miss Dent, a daughter of Sir Thomas Dent, the well-known china merchant; and after his marriage he served but a short time afloat, in command of H.M.S. *Invincible*. He retired as a Rear-Admiral in 1879.

In 1886 Admiral Mayne entered Parliament as Member for Pembroke and the Haverfordwest boroughs in the Conservative interest, and was the sitting Member at the time of his death, as well as a J.P. for the latter place. He was a warm supporter of Lord Salisbury's Government, and was indefatigable in his endeavours to promote the welfare of his sea-girt constituency. In order to keep himself thoroughly *au fait* with nautical questions which so nearly affected it, he made it his duty to be on board some one of Her Majesty's ships during all the annual strategic manœuvres and the torpedo experiments in the neighbourhood of Milford Haven.

Admiral Mayne was elected a Fellow of the Royal Geographical Society in 1862, and served on its Council.

During his naval career he had contributed considerably to our hydrographic knowledge of various parts of the world, as well as to that of the sister science, geography. He was the author of 'Four Years in British Columbia and Vancouver,' and of a work on nautical surveying, and had established for himself the reputation of an intelligent and talented officer. He was a warm-hearted and generous friend, and had gained the universal regard and esteem of the members of his own profession, as well as of a large circle of acquaintances outside it.

Captain William Grant Stairs, the news of whose unfortunate death, at the Chiunde mouth of the Zambezi, has recently been telegraphed, was born at Halifax, Nova Scotia, in July, 1863. His father, a merchant in that town, came of a family connected for several generations with the colony, and always distinguished by originality and strength of character. When twelve years of age Stairs was sent to Merchiston Castle School at Edinburgh, where he remained for three years, shy and reserved in the presence of the masters, but active and playful amongst his companions. His education was continued at the Royal Military College, Kingston, Ontario, where he studied diligently and passed out well, although not taking so high a place as to win either of the two commissions then offered for competition. Leaving Canada, Stairs went as a civil engineer to New Zealand, where he acquired considerable experience in surveying and in camping in an undeveloped country. A decision of the War Office having given additional commissions for previous students of distinction in the Kingston College, the authorities, mindful of Stairs' diligence and promise, telegraphed offering him an opportunity of entering the army. This proposal brought him at once to England, where he rapidly qualified at Chatham, and was gazetted a lieutenant in the Royal Engineers in June, 1885. The somewhat remarkable mixture of British and Colonial education, the frequent travelling to distant parts of the world, and the general resourcefulness resulting from his rough life in New Zealand, fitted Lieutenant Stairs for a more active future, and for more arduous labours than seemed likely to fall to the lot of an Engineer officer in times of peace. In the end of 1886 the opportunity of active service came in a most congenial form. When Mr. H. M. Stanley was organising the Emin Relief Expedition, Lieutenant Stairs applied to accompany him in a letter so terse and pointed, that it appealed directly to the experienced leader, and Stairs was the first officer engaged. The pages of 'In Darkest Africa' abound with testimony to his work, his obedience, and his valour; he is referred to as "alert, intelligent, who understands a hint, a curt intimation, grasps an idea firmly, and realises it to perfection;" one "who is never tired, and never says 'enough' when there is something to be done." During the journey appreciation was shown in the best way, not by words of praise—with which the officers of the expedition were rarely elated—but by orders to do the most difficult or the most responsible pieces of work. It was Stairs who was selected to relieve Nelson and Parke from the inhospitable charge of Kilonga-Longa, and bring up the steel boat left behind in the rush to the Nyanza; Stairs who was left in charge of Fort Bodo when the leader returned through the forests to find the Rear Column, and the Pasha lingered on the Lake; and it was Stairs who, when the strain of the quest was over, was detached for the exploration of Ruwenzori, the brightest spot of geographical research in the dismal journeyings. During his years in Africa, Stairs was again and again prostrated by serious illness, and ran grave risks in consequence of a wound by a poisoned arrow in the forest. When the expedition returned, he was the same man as before, equally unspoiled by success and praise as undaunted by sickness and danger. A friend who knew him intimately writes: "After his return I was much impressed with his simple modesty, and his absolute reticence, even in fun or easy talk, about matters that have subsequently been the subject of so much painful controversy. He was absolutely loyal, not only to his chief but to every comrade, telling what was to their honour, and referring to nothing else. Of himself and what he had done he could hardly be got to speak. Another characteristic was the kindly way he spoke of the natives, and the high appreciation he had of their self-denial and devotedness."

After his return in 1890, Lieutenant Stairs was made adjutant to the Engineers at Aldershot, but shortly after exchanged to a Line Regiment as Captain. In 1891 he was selected by the Belgian Katanga Company to command one of their three

expeditions to Madi's country, in the extreme south-east of the territory assigned to the Congo Free State. This Company was formed to open up the country, and to trade in indiarubber and ivory. In May, 1891, the expedition set out from Belgium, and on July 4th, 1891, Stairs left the coast for Lake Tanganyika, along the beaten caravan track. Crossing the lake he made an unprecedentedly rapid march to Ngweu, on the Luapula. Hitherto everything had gone favourably, and all were in good health, although Stairs had suffered from fever during part of the journey. The rainy season set in when the expedition was traversing the unhealthy swamp-lands of the head-waters of the Congo; but Katanga was duly reached, and the country found to be in a state of anarchy consequent on Madi's death. Stairs then directed the caravan to the Shire, and on to the coast by that river and the Zambezi; but just at the end of the journey, when he had reached Chinde, and was waiting a ship for Zanzibar, his death occurred, in June, 1892. No particulars have yet been received, but there is little doubt that Captain Stairs fell a victim to the pestilential climate of the fever-belt which forms a barrier of poison round the tropical coast of Africa.

The loss, at the early age of twenty-nine, of a man who had shown such exceptional aptitude for African travel and exploration, is deeply to be deplored, occupying as it does when the qualities of prudence, firmness, and conscientious obedience to instructions are more needed than ever before in the officers charged with advancing and maintaining European interests. Captain Stairs was elected a Fellow of the Royal Geographical Society last year, and occasionally took part in the discussion of papers on African matters read at the Evening Meetings. In his last journey he determined many positions and altitudes, but the full record of his work has not yet reached Europe.

General Albert Fytche, C.S.I.—The death of General Fytche in June has removed an Anglo-Indian officer of considerable distinction. Born in 1823, and educated at Rugby and Addiscombe, he received his commission as ensign in the 70th Regiment Bengal Army as far back as December, 1838, and a few years later was actively employed against the tribes on the Arakan frontier, where disturbances had arisen consequent on the rebellion of King Tharrawaddy. Here he gained credit for capturing the Walling Hill stockade, and was appointed Assistant Commissioner in the Arakan Commission, and, subsequently, Deputy Commissioner at Sandoway. In 1848 he retired from civil employ for a short time, in order to take part in the second Sikh campaign. He was present at the actions of Chilianwallah and Gujrat, and was severely wounded in storming Burrakalea, the key of the Sikh position. After the war he returned to Burma, and was appointed Deputy Commissioner of Bassein, which had only recently been annexed by the British, and was at that time in a most lawless condition. Here Captain Fytche did most excellent service on several occasions in routing bands of armed robbers, receiving thrice the thanks of the Government of India, together with the brevet rank of major and the Pegu medal and clasp. He was appointed Commissioner of Tenasserim and Martaban in 1857, and after holding that post for ten years, succeeded, in the place of Sir Arthur Playre, to the Chief Commissionership of British Burma. His administration of this responsible office was marked by a very decided increase of prosperity and material development of the British province, as well as by the conclusion of an important treaty with the King of Burma, which practically opened that country up to European trade. The king's consent was also obtained by Colonel Fytche on the despatch of Colonel Sladen's expedition to Western China, the geographical results of which were valuable and interesting. General Fytche was a Companion of the Star of India, and also the author of an

entertaining book of personal reminiscences in the East, published in 1878, in 2 vols., and entitled 'Burma, Past and Present.' General Fyche joined the Society in 1866. It is a notable incident, in connection with General Fyche's name, that his ancestor, Ralph Fitch, a merchant of India in the reign of Queen Elizabeth, was, so far as is known, the first traveler who explored (1583-91) both India and Burma, and by his glowing descriptions of the resources of the East undoubtedly helped to prepare the way for the formation, a few years later, of the East India Company. Another ancestor, William Fyche, was President of the English settlement at Calcutta in 1752, four years before the Black Hole tragedy.

Mr. Robert Cradock Nichols, who died recently, was, thirty years ago, an explorer of the then little-known mountains on the frontier of Savoy and Piedmont, and on this region he published several papers, illustrated by original maps of his own construction. But the great service he rendered to European cartography was in undertaking the editorship of the Alpine Club Map of the Central Alps. Outside Switzerland this map embodied a mass of original work, and corrected very largely all existing maps, including the government surveys of France and Italy. It was produced with great delicacy and beauty of execution by Messrs. Stanford; but, unfortunately, as many thought, on too small a scale to do justice to the amount of new knowledge indicated by it. It has since, therefore, been reproduced on a larger scale; but its merits have been but scantily appreciated by the general public. Mr. Nichols was a man of very considerable scientific interests and attainments. He was also printer to the House of Commons. Mr. Nichols had been a Fellow of the Society since 1865.

Professor Hermann Burmeister, the eminent zoologist and traveller, an Honorary Corresponding Member of the Royal Geographical Society, died on May 1st. He was born on January 15th, 1807, at Stralsund, studied first at Griefswald, and completed his medical course at Halle in 1829. A born naturalist, he soon deserted medicine, and devoted himself to systematic zoology. On the death of his master, Nitzsch, Burmeister succeeded to the chair of Natural History at Halle. He wrote several text-books of natural history, made valuable collections, especially of insects, and with the development of biology he gradually widened his researches to take in physical geography and geology. Hence, when he had to leave his fatherland in 1850, in consequence of the political disturbances of the time, he was well-equipped for the long journey which he undertook in Brazil, and an accident, which kept him in one place for five months, gave him an opportunity of studying minutely the fauna of the tropics. He returned to Europe for a few years; but in 1856 resumed his South American travels, visiting many parts of Uruguay, exploring the north of the Argentine Republic, and in 1859 crossing the Andes by a pass never before attempted by a European. This journey he described fully in 'Petermann's Mittheilungen' for 1857, 1860, and 1863. Once more he visited Germany, travelling by Panama and Cuba, but only to break permanently his connection with Halle. In 1861, Burmeister became Professor and Director of the Natural History Museum in Buenos Ayres, which was founded by his own energy. Nine years later he assumed charge of the newly-established Faculty of Science of the University of Cordova. This post he was ultimately obliged to resign in consequence of an accident. His later years were spent in Buenos Ayres, where he died, highly respected by the Government, and his funeral was celebrated at the public expense. One hundred and sixty-four scientific papers from his pen are recorded in the Royal Society's Catalogue, and in addition he published several books on his journeys, on the fauna and on the physical geography of the countries of South America. Of these the more important are: 'Reise nach Brasil' (1853),

'Landschaftliche Bilder Brasiliens' (1853), 'Systematische Uebersicht der Thiere Brasiliens' (3 vols., 1854-56), 'Reise durch die La Plata-Staaten' (2 vols., 1861), 'Ueber das Klima der Argentinischen Republik' (1861), and his greatest work, 'Physikalische Beschreibung der Argentinischen Republik,' of which the first volume is in German and the remainder in French, published, with atlas, in 1883.

THE ANNIVERSARY MEETING, MAY 23RD, 1892.

The Right Hon. Sir MOUNTSTUART E. GRANT DUFF, G.C.S.I., President,
in the Chair.

ELECTIONS:—Lieut. Gemmell Cameron, R.N.; Major Lourenço Edye (R.M. Light Infantry); Richard McCull Elliott; Capt. Henry Lionel Galloway; James Augustus Grant, Esq.; Ambrose Jesse Grayston, Esq.; Rev. Thomas Hammond; Hon. Duncan McBryden, J.R.; Edward William Mellor, Esq.; Frederick Paddock, Esq.; Surgeon-Colonel H. F. Paterson; Dr. T. Muller Simonis; Rev. S. A. Steinthal; Lieut. Charles Villiers; Laurence Wedgwood, Esq.

At the commencement of the proceedings, the Secretary (Mr. H. SEEBOM) read the rules which govern the business of the Anniversary Meetings, and the Minutes of the past Annual Meeting, June 15th, 1891.

The President next appointed Mr. J. S. DYASON and Mr. E. A. PETHERICK scrutineers for the ballot about to take place.

The Annual Report was then read by the Secretary, Mr. H. SEEBOM.

REPORT OF THE COUNCIL.

The Council have the pleasure of submitting to the Fellows the following Report on the financial and general condition of the Society:—

Members.—The number of Fellows elected during the year (ending April 30th, 1892) was 198, besides three Honorary Corresponding Members. In the previous year, 1890-91, the total elections amounted to 237, and in 1889-90 the number was 293. Our losses have been, by death 109 (besides five Honorary Corresponding Members), by resignation 62, and by removal on account of arrears of subscription 45; making a decrease for the year of 23. In the year 1890-91 there was an increase of 84; in 1889-90 an increase of 131. The total number of Fellows on the list (exclusive of Honorary Members) on May 1st was 3549.

Finance.—As will be seen by the annexed Balance Sheet, the total net income for the financial year ending December 31st, 1891 (i.e. exclusive of balance in hand) was £8227. 16s. 8d., of which £6677. consisted of entrance fees and subscriptions of Fellows. In the previous year, 1890, the total net income was £5317. 16s. 2d., and the amount of subscriptions, &c., 7053l.; in 1889 the two totals were £2241. 7s. 7d., and £960l. respectively.

The net expenditure for the past year (i.e. exclusive of balance in hand and the purchase of New Zealand Stock) was £1711. 3s. 9d. The net expenditure in 1890 was £2187. 5s. 10d.; in 1889, 7025l. 15s. 10d.

The Finance Committee of the Council have held, as usual, Monthly Meetings

during the year, supervising the accounts of the Society. The Annual Audit was held on April 8th last, the Auditors being, on behalf of the Council, Major Leonard Darwin and S. W. Silver, Esq., and on behalf of the Fellows at large, E. O. Tudor, Esq., and J. Duncan Thomson, Esq. The cordial thanks of the Council and Fellows are due to these gentlemen for having freely devoted their valuable time to this important task. At the end of their labours the Auditors drew up the following Report to the Council :—

Auditors' Report.—"The Auditors appointed for the examination of the Accounts of the Royal Geographical Society for the year ending December 31st, 1891, have examined the Balance Sheet submitted, and have compared it with the several Account Books and vouchers; they have found it correctly stated and sufficiently vouched.

"The Entrance Fees and Life Compositions show a falling off of 363*l.* and 655*l.* respectively, as compared with those received in the year 1890, but the following comparison proves that this is merely due to the exceptional circumstances of that year :—

	Entrance Fees. £	Life Composition. £
1891 . . .	525	498
1890 . . .	888	1153
1889 . . .	597	523
1888 . . .	477	594

"With regard to the investments, on the one side 1000*l.* has been taken from Deposit Account, but on the other the sum of 1072*l.* 10*s.* 6*d.* has been invested in New Zealand Stock; otherwise there is no change to report.

"The balance in hand was 79*l.* greater at the end of the year than at the beginning, and the income of the Society was therefore 151*l.* greater than its expenditure.

"The Balance Sheet is very satisfactory. The items on the receipt side call for no special remark; it may, however, be noted with satisfaction that there is an increase of 25*l.* from the sale of publications as compared with the year before.

"On the expenditure side it should be observed that 500*l.* was granted in aid of Expeditions, which is 50*l.* more than in the two previous years taken together. The total expenditure under the five different headings of 'Miscellaneous' was 439*l.*, as compared with 401*l.* in 1890, 381*l.* in 1889, and 489*l.* in 1888, showing no material increase on the average. This is satisfactory, we think, as indicating watchful care over petty expenses by the officers of the Society.

"The task of the Auditors was rendered easy by the excellent manner in which the accounts are kept.

"LEONARD DARWIN,	} <i>Auditors.</i>
"S. W. SILVER,	
"J. D. THOMSON,	
"E. O. TUDOR,	

"April 8th, 1892."

The following Balance Sheet and Statement, showing the Receipts and Expenditure of the Society from the year 1848 up to the present date, are annexed to the Report of the Auditors :—

Receipts.

BALANCE SHEET FOR THE YEAR 1891.

Expenditure.

1891.	£	s.	d.	1891.	£	s.	d.
Balance in Bankers' hands Dec. 31st, 1890. } 175 3 5				House:—			
Do. Accountant's do. } 16 5 4				Taxes and Insurance..	97 10 0		
			191 9 9	Repairs and Furniture	161 13 0		
Subscriptions:—				Fuel, Gas, and Water	75 17 4		
Arrears.. .. .	216 0 0			Miscellaneous	129 7 3		433 0 10
For the current year..	406 0 0			Office:—			
Paid in advance.. ..	702 0 0			Salaries	994 0 0		
			5914 0 0	Stationery and Printing	321 12 6		
Entrance Fees			525 0 0	Miscellaneous	131 6 8		1446 19 2
Life Compositions.. ..			498 0 0	Library:—			
Parliamentary Grant ..			500 0 0	Salaries.. .. .	340 0 0		
Royal Premium			52 10 0	Purchase of Books ..	106 11 1		
Rent of Shop and Vaults			105 0 0	Binding	114 8 6		
Advertisements in Monthly Proceedings	115 0 0			Miscellaneous	70 6 7		630 5 2
Sale of Publications ..	420 11 9			Map-Room:—			
Payments made in error, &c.			684 11 9	Salaries	450 0 0		
Loan of Diagrams			62 1 5	Purchase of Maps and Diagrams	103 7 2		
Payments for Scientific Instruction			2 10 9	Instruments and Repairs	318 4 4		
Amount transferred from Deposit Account. }			60 5 4	Miscellaneous	65 0 2		965 17 4
			1000 0 0	Map-Drawing-room:—			
Dividends:—				Salary	250 0 0		
North Eastern Railway 4 per Cent. Debenture Stock	39 0 0			Miscellaneous	14 6 0		264 4 0
Great Indian Peninsula Railway 5 per Cent. Stock	296 6 8			Meetings			292 2 1
Great Western Railway 4 per Cent. Stock [Davis bequest] ..	14 11 9			Modals and other awards			217 12 6
London and North Western Railway 4 per Cent. Stock [Marchison bequest] ..	30 0 0			Scientific Purposes and Education:—			
Caledonian Railway 4 per Cent. Preference Stock	76 0 0			Scientific Instruction..	133 0 0		
Norwegian 4 per Cent. Bonds	30 0 0			Grant to Oxford and Cambridge Universities ..	300 0 0		
New Zealand 4 per Cent. Stock 1000l.	30 0 0			Grant to Oxford University Extension ..	69 0 0		493 0 0
New South Wales 3 per Cent. Stock (Gill memorial)	35 1 10			Publications:—			
India Stock	34 2 6			Printing Monthly Proceedings ..	911 6 8		
India 3 per Cent. Debentures	34 2 6			Printing Vol. IV. Supplementary Papers ..	354 6 8		
Consols 3 per Cent. 1890l.	98 7 8			Maps and Illustrations for Proceedings ..	801 16 7		
" (Peck fund)	26 16 4			Postage of Monthly Proceedings	324 11 1		
" (Back bequest)	13 1 0			Payments to Contributors, Translators, &c.	204 0 0		
" (Trevelyan bequest)	13 12 4			Editor of Publications	200 0 0		
Interest on 1000l. deposited to Dec. 31st, 1891	13 5 8			Miscellaneous	22 7 0		2184 7 4
			875 9 5	Payments in error returned			57 9 4
			£ 9314 5 5	Expenditure:—			
				Grant to Asia Minor Expedition fund ..	150 0 0		
				Grant to Sig. V. Seale ..	50 0 0		
				Grant to W. M. Conway ..	300 0 0		500 0 0
				Purchase of 1000l. New Zealand Stock			1072 10 6
				Balance in Bankers' hands Dec. 31st, 1890 ..	240 8 4		
				Do. Accountant's do. ..	10 2 104		270 11 2
							£ 9314 5 5

E. L. S. COCKES,
Treasurer

Audited and found correct, April 8th, 1892.

LEONARD DARWIN,
S. W. SILVER,
E. O. TUDOR,
J. D. THOMSON,
Auditors

**STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year
1843 to Dec. 31st, 1891.**

	Year.	Cash Receipts within the Year.	Cash Amounts invested in Funds.	Deducting Amounts invested in Funds, actual Expenditure.
		£ s. d.	£ s. d.	£ s. d.
*Includes Treasury Grant of 1000 <i>l.</i> for the East African Expedition.	1849	606 10 5	.. ..	755 6 1
	1849	714 2 0	.. ..	1,074 7 6
*Includes Treasury Grant of 2500 <i>l.</i> for the East African Expedition.	1850	1,036 10 5	.. ..	877 2 10
	1851	1,056 11 5	.. ..	900 14 7
	1852	1,220 5 4	.. ..	995 12 1
*Includes Legacy of Mr. Benjamin Oliviera, 150 <i>l.</i> 37 <i>s.</i> 1 <i>d.</i>	1853	1,917 2 6	.. ..	1,615 8 0
	1854	2,005 7 4	.. ..	2,197 19 3
*Includes Legacy of Mr. Alfred Davis, 1800 <i>l.</i>	1855	2,544 7 0	.. ..	2,636 3 1
	1856	3,572 5 1	533 10 0	2,714 8 1
	1857	3,142 15 4	310 0 0	3,440 16 9
*Includes Legacy of Sir Roderick Murchison, 1860 <i>l.</i>	1858	3,049 15 1	.. ..	2,944 13 6
	1859	3,471 11 8	950 0 0	3,423 3 9
*Includes Mr. James Young's Grant for Congo Expedition, 2000 <i>l.</i>	1860	6,449 12 1	406 11 6	5,406 3 7
	1861	4,792 12 9	1,354 2 6	3,074 7 4
	1862	4,669 7 9	1,349 7 6	3,090 19 4
*Includes 1000 <i>l.</i> 1 <i>4s.</i> 6 <i>d.</i> sale of Ex- chequer Bills.	1863	5,256 0 3	1,837 10 0	3,855 4 0
	1864	4,977 4 6	1,796 6 0	3,647 7 10
*Includes Mr. James Young's Grant for the Congo Expedition, 1041 <i>l.</i> 1 <i>4s.</i>	1865	4,906 9 3	1,041 5 0	4,507 4 3
	1866	5,178 8 3	1,028 18 0	4,652 16 0
	1867	6,402 7 11	1,029 0 0	3,943 17 4
	1868	5,861 4 0	1,887 5 9	4,156 17 10
*Includes Parliamentary Grant of 3000 <i>l.</i> to Cameron Expedition.	1869	6,459 16 0	2,133 8 0	4,646 0 5
	1870	2,042 6 1	3,402 8 0	7,445 10 6
*Includes Donation of 500 <i>l.</i> by Mr. C. J. Lambert.	1871	6,037 3 7	1,000 0 0	3,728 4 4
	1872	2,119 7 9	1,992 4 6	5,471 13 2
	1873	7,761 14 10	2,015 1 6	6,097 12 6
*Includes Legacy of Admiral Sir George Back, 540 <i>l.</i>	1874	8,733 5 10	699 0 0	7,476 2 3
	1875	7,911 15 10	2,002 7 4	8,482 4 10
*Includes Legacy of Sir W. C. Tre- velyan, 500 <i>l.</i>	1876	11,811 11 8	6 10 13 1	6 10 13 1
	1877	107,950 1 11	2,594 2 0	8,940 17 11
	1878	118,124 10 0	3,000 0 0	6,561 9 6
*Includes 1000 <i>l.</i> 8 <i>s.</i> 2 <i>d.</i> sale of Ex- chequer Bills.	1879	128,979 14 10	1,551 10 10	6,980 14 2
	1880	2,529 10 4	1,667 5 1	8,104 1 10†
*Includes 1800 <i>l.</i> received from Mr. B. Leigh Smith.	1881	8,409 10 6	.. ..	8,482 0 6†
	1882	118,742 15 0	.. ..	8,779 10 7
	1883	109,589 0 0	1,001 4 0	8,624 2 11
*Includes 200 <i>l.</i> on loan from Bankers.	1884	128,964 11 7‡	.. ..	9,266 0 5
	1885	128,734 17 3	.. ..	8,556 3 10‡
*Includes 1884 9 <i>s.</i> 10 <i>d.</i> sale of India Debentures.	1886	17,968 9 0	1,000 0 0	7,767 14 0‡
	1887	8,907 16 3	.. ..	8,493 10 3
*Includes Donation of 1000 <i>l.</i> from Miss Gill.	1888	8,173 6 0	.. ..	7,904 18 6
	1889	8,224 7 7	1,000 0 0 On deposit.	7,025 15 10
	1890	9,521 16 2	550 0 0	8,219 5 10
	1891	8,322 16 8	1,000 0 0	8,171 3 9

* This sum includes the Special Parliamentary Grant transferred to the Cameron Expedition Fund in February 1877.

† This amount includes the payment of two sums of 500*l.* each, contributed to the African Exploration Fund in this and the previous year.

‡ This sum includes the payment of 102*l.* 8*s.* to the African Exploration Fund; also 71*4s.* 9*d.* 1*d.*, the final payment for Cameron Expedition Fund.

STATEMENT OF ASSETS—December 31st, 1891.

	£ s. d.
Freehold House, Fittings, and Furniture, estimated (ex- clusive of Map Collections and Library insured for 10,000 <i>l.</i>)	20,000 0 0
Investments (amounts of Stock), as detailed in the above Report of the Auditors valued April last at	26,536 8 8
Arrears due on December 31st, 1891, £1169. Estimated at	467 0 0
Balance at Bank	£260 8 4
" in Accountant's hands	10 2 10½
	<hr/>
Total	£47,273 19 10½
	<hr/>
	2 L

Publications.—The monthly 'Proceedings' have been issued with regularity throughout the year; the twelve numbers for 1891 forming a volume of 780 pages, illustrated by 21 maps and 9 pictorial diagrams. The total cost of the edition of 5000 copies (including 324*l.* 11*s.* 1*d.* for free delivery to Fellows and Institutions) was 2404*l.* 1*s.* 4*d.* From this is to be deducted the amount of 584*l.* 11*s.* 9*d.* received from sale of copies to the public and from advertisements. The sum of 351*l.* 6*s.* 5*d.* was expended on 'Supplementary Papers.'

Library.—During the past year 800 books and pamphlets have been added to the library; 623 by donation, and 177 by purchase; 229 pamphlets have been put in covers by the Society's map-mounter, and 350 volumes have been bound.

The sum of 106*l.* 14*s.* 10*d.* has been spent in purchasing books, and the further sum of 105*l.* 17*s.* 7*d.* in binding for the Library.

Among the more important accessions are the following:—Casati, 'Ten Years in Equatoria,' 2 vols.; continuation of Theal's 'History of South Africa' (the Publishers); Pruett, 'The Arab and the African' (the Author); Horsford, 'The Defences of Norumbega' (the Author); 'Die Bakaren,' Vol. VII. (the Archduke Ludwig Salvator of Austria); Iedina, 'An Asien's Kusten und Fürstenhöfen' (the Publisher); Bink, 'Kongo Land' (the Publisher); Gessi, 'Setti Annal nel Sudan Eiziano,' an English translation (the Publishers); Dr. Junker's 'Reisen in Afrika,' Vol. III., and English translation of Vol. II. (the Publishers); Peters, 'New Light on Dark Africa'; Schinz, 'Deutsch Südwest-Afrika'; Wissmann, 'Meine zweite Durchquerung Aequatorial-Afrikas'; Markham's 'Life of Sir John Franklin' (the Publishers); James, 'The Unknown Horn of Africa,' second edition (the Publishers); Leared, 'Morocco and the Moors,' second edition (the Publishers); continuation of the 'Dictionary of National Biography,' of Reclus' 'Nouvelle Géographie Universelle,' and of St. Martin's 'Nouveau Dictionnaire de Géographie Universelle'; the publications of the Meteorological Office, the Intelligence Department of the War Office, and of the Admiralty, including a collection of the New Editions of the Sailing Directions and Pilots; the publications of the International Geodetic Association; continuation of the General Report of the Survey of India (the Director-General of the Survey), and of the publications of the Geological Survey of India (the Indian Government); Ridley's 'Tribes and Castes of Bengal,' 2 vols., Black's 'Memoir on the Indian Surveys, 1875-1890,' and Synoptical Vols. XXII., XXIII., and XXIV. of the Great Trigonometrical Survey of India (the Secretary of State for India); new editions of Murray's, Joanne's, and Baedeker's Handbooks; the publications of the Hakluyt Society; continuation of the Report on the Scientific Results of the Voyage of the *Challenger* (the Lords of the Treasury); Thomas, 'Untrodden Jamaica' (the Author); Thwaites, 'The Colonies, 1492-1750' (the Publishers); Codrington, 'The Melanesians' (the Publishers); Hort's 'Tahiti' (the Publisher); Gibbon's 'History of Commerce in Europe' (the Publishers); Johnston's 'Livingstone' (the Publishers); Silver and Co.'s 'Handbook to South Africa,' fourth edition; Murray's 'South Africa' (the Publisher); Pitcairn's 'New Guinea' (the Author); Zoller, 'Deutsch-Neuguinea'; Obrie's 'Voyages in Asia; Thoulet, 'Océanographie (Statique)' (the Author); Benyowsky's 'Mémoires and Travels'; Bowen's 'Geography,' 2 vols. (Royal Astronomical Society); Boad's 'Description of the Azores'; Labat's 'L'Afrique Occidentale,' 5 vols., and 'Relation historique de l'Éthiopie Occidentale,' 5 vols.; Chesney's 'Narrative of the Euphrates Expedition'; Codrington's 'Mémoire géographique sur la Mer des Indes'; Pratz, 'Histoire de la Louisiane,' 3 vols.; Lord Mansel's 'Views in the High Alps'; the publications of the United States Geological Survey, and of the Smithsonian Institution, including the Bulletin of the Survey, Tenth Annual Report of the Survey, 2 Parts, by J. W. Powell, and Annual Report of the Smithsonian Institution, 1889 (the U. S.

Geological Survey and the Smithsonian Institution); Report upon U. S. Geographical Surveys West of the One Hundredth Meridian, Vol. I., Geographical Report (Capt. G. M. Wheeler); Powell's 'Exploration of the Colorado River of the West'; Report of the U. S. Coast and Geodetic Survey, 1889 (the Survey); the publications of the U. S. Hydrographic Office and of the U. S. Naval Observatory; continuation of the Annual Report of the Geological and Natural History Survey of Canada (the Director of the Survey); the publications of the various Australian Governments; Report of the Survey Department, New Zealand, 1890-91 (the Surveyor-General); Vol. IX. of the Royal Society's Catalogue of Scientific Papers (the Royal Society); 'La Correction des Torrents en Suisse' (the Swiss Department of Public Works); Foreman, 'The Philippine Islands' (the Author); Baumann's 'Usambara' (the Author); Mathers, 'Zambezia' (the Author); Muller's 'Zuid-Afrika' (the Author); Fischer, 'Zwei Kaukasus Expeditionen'; Wolff's 'Country of the Vosges' (the Publishers); Monteiro's 'Delagoa Bay' (the Publishers); Wingate's 'Mahdum and the Egyptian Sudan' (the Publishers); Dawson's 'Geology of Nova Scotia,' &c., fourth edition (the Publishers); Rink's 'Eskimo Tribes' (the Author); Mannering's 'New Zealand Alps'; Prince Roland Bonaparte, 'Une Excursion en Corse' (the Author); Rockhill's 'Land of the Lamas' (the Author); Ellis, 'Tshi-speaking Peoples of the Gold Coast, W. Africa'; Arnold's 'Sens and Lands,' second edition (the Publishers); Le Strange, 'Palestine under the Moslems'; Portal's 'Mission to Abyssinia' (the Publisher); Roth's translation of Crozet's Voyage to Tasmania; Winsor's 'Christopher Columbus'; Archer's 'Journey to the Mc-Kong Valley'; Beauvalot, 'De Paris au Tonkin,' also English edition, 2 vols. (the Publishers); Gunther 'Lehrbuch der physikalischen Geographie'; Mrs. Bishop's 'Journeys in Persia and Kurdistan,' 2 vols.; Binger, 'Du Niger au Golfe de Guinée,' 2 vols.; Whympers's 'Travels amongst the Great Andes of the Equator,' with Supplementary Appendix (the Author); and Asensio's 'Cristoval Colon,' 2 vols.

Scientific Purposes Grant.—During the past year 26 intending travellers have received instruction from Mr. Coles, in Practical Astronomy, in the Society's Observatory, and in route surveying with the theodolite, prismatic compass, and plane-table, in the country, and 358 hours have been devoted to teaching.

Instruments to the value of 30*l.* 12*s.* 6*d.* have been lent during the past year to the following travellers:—Major C. M. Macdonald (Niger Region), 67*l.* 16*s.*; Mr. W. M. Conway (Himalayas), 76*l.* 18*s.*; Mr. J. W. Wells (Haiti, W. Indies), 12*l.* 1*s.*; Mr. A. E. Pratt (Upper Amazon), 145*l.* 17*s.* 6*d.*

The instruments lent to the following gentlemen have been returned during the past year, with the exception of those which have been lost:—Mr. E. A. Floyer (Egypt), 1891; Mr. A. P. Maudslayi (Central America), 1890; Prof. W. M. Ramsay (Asia Minor), 1891; Mr. J. Theodore Bent (Mashonaland), 1891.

The following is a list of travellers who still have instruments lent to them in their possession:—Rev. W. P. Johnston (East Africa), 1879; Rev. T. Wakefield (East Africa), 1882-83; Mr. W. Dennis Cowan (Madagascar), 1883; Mr. E. Douglas Archibald (for coral observations in England), 1885; Dr. E. J. Baxter (East Africa), 1885; Mr. F. C. Selous (South Central Africa), 1888; Mr. H. H. Johnston (Mozambique), 1889; Mr. F. S. Arnot (Central Africa), 1889; Rev. A. Hetherwick (South-East Africa), 1889; Mons. H. M. P. de la Martinière (Morocco), 1889; Mr. H. Halsey (Maury Peninsula), 1890; Dr. D. Kerr-Cross (South-East Africa), 1891; Lieut. B. L. Slater, n.e. (Mr. H. H. Johnston's expedition, South-East Africa), 1891; Major C. M. Macdonald (Niger Region), 1891; Mr. W. M. Conway (Himalayas), 1892; Mr. J. W. Wells (Haiti, West Indies); Mr. A. E. Pratt (Upper Amazon).

Exhibitions in the Map Room.—During the season a series of exhibitions of

Photographs, weapons, implements, etc., in connection with papers read before the Society, have been held in the Map Room for several days after each Meeting.

Map Room.—The accessions to the Map Room Collection during the past year comprise 574 Maps and Charts on 1260 sheets; 34 Atlases (including continuations) containing 861 sheets of Maps, 981 Photographs, 228 Lantern Slides. Of these, 37 Maps on 246 sheets, 18 Atlases, 130 Photographs, and 228 Lantern Slides have been purchased. The accessions exceed those of the previous year by 258 Maps, 9 Atlases, 281 Photographs, and 77 Lantern Slides.

Among the more important donations to the Map Room Collection are:—*Maps.*—26 sheets of the Ordnance Survey of the British Isles (presented by the First Commissioner of Public Works, through the Director-General of the Ordnance Survey); 342 British Admiralty Charts (The Lords Commissioners of the Admiralty, through the Hydrographer); 228 sheets of the various Indian Government Surveys (H.M. Secretary of State for India); 19 United States Charts (Hydrographer to the Bureau of Navigation, Washington, D.C.); 14 French Charts (Service Hydrographique de la Marine, Paris); 24 Maps published in Petermann's 'Geographische Mitteilungen' (Herr Justus Perthes); Geological Map of Monte Somma and Vesuvius, by H. J. Johnston Lavis, M.D. (Messrs. G. Philip & Son); 48 Maps of the United States, &c., published by Rand, McNally, & Co. (the publishers, through E. Stanford, Esq.); Plan showing the Route taken by Dr. Jameson and Messrs. Doyle and Moodie from Umtali to the Limpopo, and MS. Map of Route taken by Major Sir J. C. Willoughby from Hartley Hill to Tete, *vis* Zumbo, 1891 (Major Sir J. C. Willoughby, Bart.); MS. Map of Matabele Land F. C. Selous, Esq.; Specialkarte vom westlichen Kleinasien, Part III. (Dr. H. Kiepert); 3 sheets of the Generalstabens topografiske Kart over Danmark (Danish Minister of War, through the Danish Legation); Topographischer Atlas der Schweiz, Parts XXXVIII. and XXXIX. (Bureau Topographique Fédéral à Berne); 12 sheets of Government Survey Maps of Ceylon (Surveyor-General of Ceylon); Nouvelle Carte de l'Atlantique Nord, Étude des Courants (S.A.M. le Prince Albert de Monaco); MS. Map of Damaraland and Namagualand (Capt. S. Israel). *Photographs.*—53 Photographs of the New Hebrides (J. W. Landt, Esq.); 9 Photographs of Iceland (F. W. W. Howell, Esq.); 4 Photographs of the Miranzai (Samana) Country and the Black Mountain (Col. A. Le Messurier, R.E.); 76 Photographs of France and Switzerland (James Jackson, Esq.); 36 Photographs of the West Indies (F. J. W. Jameson, Esq.); 95 Photographs of Egypt (Messrs. G. Lekegian & Co., through Major F. R. Wingate, R.E.); 24 Photographs of Addo, Igbesa, and Ilaro Countries, West Yoruba Frontier (George Denton, Esq.); 42 Photographs of Guatemala, &c. (Edwd. Gledhill, Esq.); 26 Photographs of S.W. Iceland (Capt. A. F. Mockler-Ferryman); 65 Photographs of Masai Land, Victoria Nyanza, &c. (Ernest Gedge, Esq.); 55 Photographs of Palestine (G. Robinson Lees, Esq.); 32 Photographs of Korea (C. W. Campbell, Esq.); Album containing 150 Photographs of Mashonaland (W. Ellerton Fry, Esq.); 6 Photographs of Japan, showing the effects of the late Earthquake (Rev. Walter Weston); 130 Photographs of Bosnia and Herzegovina (Mons. M. de Dechy); Album of Photographs of Japan to illustrate the effects of the late Earthquake (Professors J. Milne and W. K. Burton).

Five new Diagrams have been constructed by the Society's draughtsman, and alterations and corrections have been made to five others.

The report having been read, its adoption was moved by Sir EDWARD HERTSLET and seconded by COLONEL H. C. B. TANNER, and unanimously accepted by the meeting.

PRESENTATION OF THE ROYAL MEDALS.

The Royal Medals for the Encouragement of Geographical Science and Discovery had been awarded by the Council as follows:—

The Founder's Medal to Mr. ALFRED RUSSEL WALLACE, the well-known naturalist and traveller in the tropics of both hemispheres, and co-discoverer with Charles Darwin of the theory of natural selection, in recognition of the high geographical value of his great works, 'The Geographical Distribution of Animals,' 'Island Life,' and 'The Malay Archipelago.'

The Patron's Medal to Mr. EDWARD WHYMPER, for the results of his journey in 1879-80, recorded in his work, 'Travels among the Great Andes of the Equator.' (London, 1892. 3 vols.) In the course of his explorations Mr. Whympers twice ascended Chimborazo, spending sixteen nights at elevations over 16,000 feet, and ascertaining its true elevation, hitherto exaggerated. He also ascended to the tops of Cotacachi, 16,301; Antisana, 19,335; Pichincha, 15,918; Sincholagua, 16,365; and Cotopaxi, 19,613; camping on the head the better to observe the crater. He has largely corrected and added to our geographical and physical knowledge of the mountain systems of Ecuador. Appended to his book is a route-map, extending over 250 miles, and fixing the position of all the great Ecuadorian mountains, constructed from original theodolite observations, with a detailed survey of Chimborazo and its glacier system. By means of three mercurial barometers 70 altitudes were ascertained. Eight aneroids were also used, and by a series of experiments and comparisons the defects of the instrument were illustrated, together with the inadequacy of the tests hitherto applied to them. Mr. Whympers also made a series of careful observations on the action of low pressures on the human frame.

In presenting the medal to Mr. WALLACE, the President addressed him as follows:—I have much pleasure, Mr. WALLACE, in handing to you the Founder's Medal of the Royal Geographical Society. Your devotion to the science, which it is our object to advance, began in very early life, when you accompanied your and our friend Mr. Bates far up the Amazons into regions then hardly known to science. After giving to your countrymen the firstfruits of your observations, you transferred your activity to the opposite end of the world, and for eight years wandered "on from island unto island at the gateways of the day." You enshrined much of the vast amount of knowledge, which you had acquired during these eight years, in your fascinating work on the Malay Archipelago; but not satisfied with having done so, you proceeded, in one important treatise after another, in your 'Geographical Distribution,' in your 'Tropical Nature,' in the 'Island Life' of which you have just given us a new edition, to re-state, to co-ordinate, and to reason in the most lucid manner upon the facts which you had accumulated. In your thoughts, geography and the influence of their environment upon animals had always a very large space. It is chiefly on account of these labours that I have the pleasure of placing in your hands this medal. Some of your friends may wonder that that pleasure did not fall to one of my predecessors; but the answer is, I think, a simple one. No one can with impunity be pre-eminently great in any one department: his greatness in that is quite certain to obscure his merits, however remarkable, in other fields of labour. Your position as a naturalist has somewhat hid from men's eyes your great achievements as a geographer, just as the shadow of Etna falls impartially not only over the hills and valleys, but also over the mountains of Sicily. Personally, I can only rejoice at a circumstance which has given me the privilege of doing what I now do.

Mr. WALLACE replied in the following words:—I have first to thank you for the exceedingly kind and flattering manner in which you have presented me with this

medal; and as it is now many years since I attended the meetings of the Society, I may perhaps be permitted to say a few words in relation to my earliest journeys. I feel this honour which you have done me to-day to be an exceptionally great one, because I have never considered myself, and never made any claim to the character of, a geographer pure and simple. My travels in various parts of the world have always been in pursuit of the marvels and mysteries of nature. In that pursuit I have been led into very remote districts, and I think, although I may be mistaken, that there are a few remote parts of the world into which I then penetrated which still remain almost or quite virgin ground to the explorer. It is now forty years since I left the valley of the Amazon—forty years of wonderful activity in exploration. Every part of the world has been ransacked more or less by our travellers, and yet I think, as far as my knowledge goes, there are a few places where, as yet, no traveller has followed my footsteps. For example, I may refer to my journey up the great River Uapés, the largest branch of the Rio Negro, which I ascended for upwards of 350 miles, passing 38 distinct cataracts and rapids. I may be wrong, but I have never met with the account of any traveller who followed me there, except my friend Dr. Spruce, the well-known botanist, and he did not go beyond the first cataract. Since the time I left the Amazon the facilities for travelling have been enormously increased. When I ascended the great river from Para to the Rio Negro I was obliged to go in small native boats, travelling along at the leisurely rate of 12–20 miles a day owing to the necessity of travelling either by oars or tracking along the banks, the current being too rapid to sail up. I and my lamented friend Bates had to travel in that way, so that a journey of 1000 miles, now easily done in a week, occupied us ten, or even twelve, weeks; the facilities for travel are now so enormously increased. But so vast is that great valley in the ensemble of its branches and tributaries, that there is probably still much unexplored ground in that part of the world. Turning to the Malay Archipelago, no doubt that ground has been well travelled over owing to the facilities for reaching it being greater than on the Amazon. Yet I had experiences and pleasures which probably no other traveller has enjoyed. For instance, I do not think that any other traveller has ever performed a sea journey of 1000 miles in a purely native Malay prau, a vessel with bamboo masts and mat sails, and on which a primitive water-clock was in use for the steersman. In the same way, though the Aru Islands have been visited since by several travellers, I don't think any person has resided there, as I did, for six months, during the whole period when that most interesting fair or market at Dubbo was in full swing—a place where now, as for centuries past, all the races of the Archipelago meet together to carry on trade in the valuable products of that country, chiefly mother-of-pearl shell, trepang, and birds of paradise. Neither do I think that any subsequent traveller has visited, or at all events resided in, the small but interesting island group of Goram, S.E. of Coram, where I stayed for some months. Nevertheless, these journeys are as nothing compared with the wonderful, toilsome, and dangerous explorations which you so frequently have recorded before this Society. No doubt, as the President has said, the honour you have done me to-day depends upon my application to those less familiar branches of Geography, especially the geographical distribution of animals and plants, and the relation of changes in sea and land to their distribution, the causes which led to the various revolutions of climate in past epochs, and the relations of the various races of mankind to each other. It is in recognition of this work, to which, more or less, I have devoted myself for the greater part of my life, that this honour has been done me to-day; and I feel it an exceedingly great honour, and beg to thank the President and Council for it.

In presenting the medal to Mr. Whymper, the President said:—Mr. Kinglake, the most brilliant tourist whom England has ever produced, conferred upon himself

the title of Sabalkansky—"Transcuder of the Balkans." You, Mr. Whymper, have transcended so many mountains, compared with which the Balkans are the merest molehills, that to convey in a single phrase the fact that you had transcended them would overtask the powers of any modern or ancient language, although both Greeks and Germans have effected considerable things in the coining of compounds. You have done, however, a great deal more than merely to transcend mountains; you have added largely to our acquaintance with the configuration of Ecuador; you have proved the existence of glaciers among its mountains, which was before doubted or disbelieved; and you have made observations upon the way in which the human frame is affected at high altitudes which may be of the greatest practical importance in enabling us to study lofty ranges. For these and other great services to science, not forgetting your two visits to Greenland twenty-and-five and twenty years ago, I have now the pleasure of handing to you the Patron's Medal of the Royal Geographical Society.

MR. WHYMPER replied as follows:—In receiving this medal at your hands, I am both doubly and singularly gratified. Under any circumstances it would be pleasant to know that anything I had done met with the approval of your Council. It is doubly gratifying to have your prompt recognition, without waiting for a popular verdict; and it is singularly so because this is the first occasion I have gained the approbation of a scientific body.

The small country called the Republic of the Equator may be termed unique. Though a mere dot on the map of the world, it embraces the varieties of a continent, and there is no other equal area on the globe containing so great diversity and such strongly-marked contrasts. Some travellers who have returned from it have been embarrassed by the extent of their information, and others, yet to come, will express surprise that so much has been overlooked by their predecessors.

Rising, as it does, upon the Equator, from the shores of the sea to a height of more than 20,000 feet, it includes almost every variety of climate, from tropical to arctic. Neither its heat nor its cold is unendurable, and in its lower and middle zones both the temperature and the weather are agreeable. But the contrary is the case in the upper and in the highest zones; and though I will not whine, or even whimper, over our experiences amongst the Great Andes of the Equator, I venture to point out to any who may propose to travel among these mountains at high levels for the sake of pleasure, that they may confidently look for weather which will combine the ferocity of the blizzard with some of the worst features of a London winter, and that they will probably find about one-half of their time occupied in getting wet, and the greater part of the remainder taken up in endeavours to become dry.

Amongst my own predecessors in this country there have been travellers of the highest eminence, including one who was the most illustrious of his generation, if not indeed of this century. In some few matters I have felt constrained to differ from his conclusions, and even to question the accuracy of his observations. Nothing that I could say would add to his fame; but should any suppose that, unable to augment, I seek to dim the lustre of his great reputation, let me take this occasion to declare that my travels amongst the Great Andes of the Equator were due to the inspiration and example of Alexander von Humboldt.

The principal object that I had in view when travelling amongst the Great Andes of the Equator was the observance of the effects of low pressures, and I took the opportunity to compare the readings critically of aneroid barometers against my standards, namely, two Fortin mercurial barometers.

I found that all the aneroid barometers I carried gradually acquired very large errors, and that all in course of time read *lower* than the mercurials, sometimes to

the extent of an inch and more. If I had relied upon these instruments in observations for altitude, I should often have been led into errors of one to two thousand feet. I observed aneroids falling (that is to say, indicating a *diminution* in atmospheric pressure), at a time when the mercurials were rising, and showing that pressure was *increasing*, which shook one's faith in their value as meteorological instruments.

Eleven years ago, in this room, I briefly adverted to these matters, and, admitting the perplexity that these and other points (to which I do not now refer) had caused me, intimated that I did not desire to pursue the subject. I nevertheless did pursue it. I examined and re-arranged my observations for several years, and at last tabulated the means of the whole of the aneroid observations in chronological order, did the same with the readings of each individual instrument, and took out the differences from the mercurial barometer of each mean and each individual reading. When this was done, I saw that *time* as well as variations in pressure affected the results.

I then brought this matter to the test under the air-pump, and submitted numerous aneroids to an artificial diminution of pressure equivalent to that which they had experienced in the field, and for the same length of time, and found, first, that all aneroids lost under diminution of pressure, and continued to do so usually for several weeks; but that they recovered their loss upon restoration of pressure, and thereby added another cause of perplexity.

These matters are fully set forth in my pamphlet, entitled "*How to use the Aneroid Barometer.*" Unless this pamphlet is examined attentively, it may perhaps give the impression that aneroid barometers are hopelessly untrustworthy. More careful perusal will show that they may be turned to valuable account by those who acquaint themselves with the rules which govern their working. The large numbers of these instruments which are constantly required for a diversity of purposes show that they are found of not inconsiderable utility, notwithstanding their defects; and I refer to this matter on the present occasion because there are good hopes that the worst of these defects can be remedied.

A short time after the appearance of this pamphlet, I received a communication from an entire stranger, inquiring if a course that he suggested would not meet the difficulties. I think that it would do so, so far as observations for altitude are concerned; but as his idea has not yet taken a practical form, I am unable at present to say more about it, although I have something further to communicate about the aneroid barometer.

Mr. Hicks and I have not been content to leave off our experiments without effecting some improvements, and, having obtained a clue to the cause of the loss upon the mercurial under prolonged diminution of pressure, we have endeavoured to abolish the cause of error. Our first experiments led to no results; but they have been continued, and I am glad to be able to inform you that there is at the present time an aneroid in my workshop which has been kept continuously at a pressure of eighteen inches for nearly a week (or about the equivalent of my first camp on Chimborazo), and its loss upon the mercurial barometer in that time amounts to much less than that which usually occurs in aneroids when kept at a pressure of eighteen inches. This instrument is a distinct advance upon all others that have preceded it.

This is not the occasion to go into details; but, if space can be afforded me, I propose to refer to it at the August meeting in Edinburgh of the British Association. I think, however, it may be said now, without holding out undue expectations, there is every probability that in a short time the public will be able to obtain, at no greater cost than before, aneroid barometers which will be much more free from

the tendency to lose under prolonged diminution of pressure than the instruments which are at present in use.

The mark of approbation which you bestow upon me to-day will encourage me to persevere in these and in other enquires which may assist the progress of geographical science: though, indeed, I need no stimulus, for, of all the various legitimate objects for ambition with which I am acquainted, I know none that is more honourable and legitimate than the discovery and making known of the earth on which we dwell, and I know no pursuit which brings with it a higher satisfaction.

OTHER AWARDS.

The **PRESIDENT** then announced that the Council had awarded the Murchison and other premia of the year as follows:—

The **MURCHISON GRANT**, to Mr. ROBERT M. W. SWAN, surveyor and geologist, who accompanied Mr. Bent in his expedition to Mashoonaland, making a careful route-map of the country traversed down to the East Coast at Beira. His observations have materially altered the cartography of the region.

The **BACK GRANT**, to the Rev. JAMES SIBREE, for his many years' work on the geography and bibliography of Madagascar.

The **CLITHERET-PEER GRANT**, to Mr. CHARLES W. CAMPBELL, for his important journeys in Korea.

The **GILL MEMORIAL**, to Mr. G. H. GARNELL, recommended for an award by Colonel Dalton, of the Army Intelligence Department, for important geographical work done during the past 15 years in Sierra Leone.

PRESENTATION OF THE TRAINING COLLEGE PRIZES.*

The Scholarships and Prizes offered by the Society to the students of training colleges, for proficiency in geography at the examinations in December last, had been awarded by the examiners in the Education Department to the following:—

MALE STUDENTS—Prizes—(£4 each):—F. G. ARNEY, Durham College; A. BATTERSBY, Westminster College; F. H. FLINT, Borough Road College; H. FOSTER, Borough Road College; J. H. WATSON, Carnarvon College (all bracketed equal).
FEMALE STUDENTS—Scholarship:—Violet Mary Webb, Stockwell College; **Prizes:**—1. Margaret Routledge, Southlands College; Mary Baxter, Stockwell College; Lydia Rawlins, Whitlands College. 2. Florence Aldhouse, Southlands College; Mary Hay, Southlands College.*

* The Medals, for the promotion of geographical education, placed by the Society at the disposal of the syndicates respectively of the Oxford and Cambridge Local Examinations, were awarded as follows:—

1891. Oxford (June).—*Silver Medal*—Hansuh Wilhelmina Bell, Nottingham. *Bronze Medal*—Muriel Marles-Thomas, Swansea. *Bronze Medal*—Lentile Maurice Crump, Crosby. *Atlas*—William Arthur Freeman, Birmingham. Cambridge (December).—*Silver Medal* (Physical Geography)—William Ernest Callmore, Harrogate. *Silver Medal* (Political Geography)—Richard Towneley Whitaker, Blackheath.

The Prize Atlases offered by the Society for geographical proficiency to the cadets of the Nautical Training Colleges, on board H.M. ships *Worcester* and *Courage*, were awarded, at the examinations held in July, 1891, to the following:—Lewis Malcolm Gordon (*Worcester* training ship); Thomas Edmund Zambanski (*Courage* training ship).

Mr. H. J. MACKINDER, in introducing the successful students, made the following remarks:—I have been asked, before introducing the candidates, to say a word or two on the department of the Society's business which comes especially under my notice, and on the present condition of that department. I have to speak, in the first place, of the work done in the five years during which the Society has been making itself felt in the University of Oxford. The term of five years for which the Readership was originally created is now complete, and we are embarking upon a further period of five years by treaty between the Geographical Society and the University. I have in a very few words to say what it is we have achieved and what we have still to do. For the first two years the work was purely experimental, and I think we may write that off. For the last three years we have, I think, been accomplishing something. We have had about 150 honour students, chiefly in the "history school," who have passed through courses of instruction. We have had, in addition to that, 50 lady students, chiefly from the Halls established in Oxford. We have brought together at the least the nucleus of a collection of the necessary apparatus. The Reader has been placed *ex officio* upon the Board of Faculty governing the honour school in history. The University has, in consequence of the Society's action, been induced to venture a further outlay of £1050. The Society and University have recently created a University prize—a Geographical Studentship, and thus raised the subject to the level of other subjects pursued in the University. We have still to create what there is in almost every German University—a Geographical Institute. There is one, I may say, already in operation in Harvard University, in America, where teachers are more free from examination trammels than we are. It seems to me that the task of creating that Institute must be a chief duty of the next five years. We desire to pass into a stage where we can give our students not merely instruction, but also opportunity for original work. May I suggest in that connection, that there are many members of this Society who, sooner or later, might be able to help us in the formation of such a teaching collection as the University would find it worthy of it to accept. We have, further, brought some influence to bear on the extra-mural work of the Universities of Oxford and Cambridge—in the Board and Local Examinations and the Extension lectures. With reference to the work of the sister University, and the other Universities in England, I am afraid I am comparatively ignorant, and it would not befit me to speak.

With reference to the training colleges, and the pupils who will be brought before your notice, I am asked to state that a change has been decided upon in the method of the award of these premiums in future. In the place of a single scholarship of £15, together with four or five book prizes, in accordance with the wishes of the Education Department there will be three equal money prizes, together with book prizes, as heretofore. The wording of the Council resolution is not perfectly clear, but I presume it means five book prizes. In that case the total number of prizes will be increased from five to eight. In the present year all the male students have been bracketed as equal. In introducing to you the lady-students from Stockwell College, I should like to say that I have known for some time past the special efforts this college has been making in the direction of geographical training, and it is with very great pleasure I am able to note that they have been successful.

The Scholarships, Prizes, and Diplomas were then presented, after which the Rev. J. P. Fauntleroy, Principal of Whitlands Training College, Chelsea, made the following remarks:—I have to ask permission to return thanks on behalf of the training colleges to the Royal Geographical Society for these prizes that have been given for many years. Before the Society gave the prizes to the training colleges, it tried the public schools by giving a gold and a silver medal, as well

na books. Those of you who know the education system of our public schools, know that if there is one thing less taught than another it is geography. Of course it was quite possible to coach up any particular lad not going in for anything else, and enable him to get the gold medal. After experimenting for some years, the Society found that instead of encouraging the prosecution of the study of geography, this was more or less a farve. Then they took up the training colleges. Most of you know that in the training colleges at the present time there are about 5000 students—young men and women between the ages of eighteen and twenty-one—preparing to be teachers. Those who obtain the prizes have to pass a severe examination, and when they become teachers of primary schools, have to teach the subject. You can see, therefore, that the Society was moved by a considerable amount of wisdom when it gave prizes to students of these colleges. Some years ago a pupil of mine, Miss Alexander, had the pleasure to receive the first prize. I have received a letter from her to-day from Cape Colony, where she is head-mistress of an important girls' school. The students in our training colleges not only go to the primary schools, but, when they have obtained their Parchment Certificates, to advanced schools in different parts of the empire. I think it is an admirable plan to divide the £15 prize into three prizes. Those ladies and gentlemen present who know anything of examinations, know what it is to go through 4000 to 5000 papers, each of which takes about three hours to write. Certain officers of this Society who went to see the prize papers expressed themselves as greatly astonished at the excellent work produced; thus the paper work shows to what a very high level in geography students reach in these colleges.

Mr. J. Y. BUCHANAN, Lecturer in Geography at the University of Cambridge, being called on by the President, then spoke as follows:—I have prepared no statement, and therefore what I have to say will be contained in but a very few words. The Lectureship at Cambridge has not been going on so long as that at Oxford; in fact, we have only been at work three years, and as Mr. Mackinder says the first two years at Oxford should be written off, I think the same may be done with regard to Cambridge. It was not until the beginning of this year that the authorities were good enough to give us a room in the New Museum for our lectures. The effect of this was at once apparent in the number of students collected. For the first two years but few attended; this year I have no reason whatever to be dissatisfied; and I think we may look forward, in the year to come, for an improvement in the attendance and the results attained. Unfortunately, so far, no proposal has been made to connect the Geographical Lectureship with any Faculty, and examinations are so exacting that students find they have enough to do in preparing the subjects necessary without attending lectures on extra subjects. I have said we are satisfied with the result attained this year, and hope we shall go on steadily increasing.

THE BALLOT FOR THE COUNCIL, 1892-93.

The Ballot for the new Council then took place, and the scrutineers, on completing their examination of the balloting papers, announced that the list, as recommended by the Council, was adopted. The list is as follows, the names of new members, or those who change office, being printed in *italics*:—

President:—Right Hon. Sir Mountstuart Grant Duff, G.C.S.I., C.I.E., &c. *Vice-Presidents*: Sir Rutherford Alcock, K.C.B.; Sir Joseph Hooker, K.C.S.I., C.B., F.R.S.; Sir John Kirk, K.C.B., G.C.M.G., F.R.S.; *Major-General* Sir H. C. Rawlinson, Bart., G.C.B., F.R.S.; General R. Strachey, R.E., C.S.I., F.R.S.; *Clements R. Markham*, Esq., C.B., F.R.S. *Treasurer*: Edward L. Somers Cocks, Esq. *Trustees*: Right Hon.

Lord Aberdare, G.C.B., F.R.S.; Right Hon. Sir John Lubbock, Bart., F.R.S. Secretaries: Douglas W. Freshfield, Esq.; H. Seeböhm, Esq., F.L.S. Foreign Secretary: General Sir C. P. Beauchamp Walker, K.C.B. Members of Council: W. T. Blanford, Esq., F.R.S.; Hon. G. C. Brodrick; Hon. G. Curzon, M.P.; Lieut.-Colonel James Cecil Dalton, R.A.; Major Leonard Darwin, R.E.; Francis Galton, Esq., F.R.S.; Sir George D. T. Goldie, K.C.M.G.; Major-General Sir F. J. Goldsmid, F.C.S.I., C.E.; Sir Arthur Hodgson, K.C.M.G.; Sir William Mackinnon, Bart., C.I.E.; E. Delmar Morgan, Esq.; John Murray, Esq.; Cuthbert E. Peek, Esq.; Ernest G. Ravenstein, Esq.; Sir Rawson W. Rawson, K.C.M.G., C.B.; P. L. Selater, Esq., F.R.S.; S. W. Silver, Esq.; Colonel H. C. B. Tanner; General J. T. Walker, R.E., C.B., F.R.S.; Captain W. J. L. Wharton, R.E., F.R.S.; Colonel Sir Charles W. Wilson, R.E., K.C.B., K.C.M.G., F.R.S.

The President gave his Annual Address on the Progress of Geography.* On its conclusion—

Sir JOSEPH D. HOOKER rose and said:—My pleasure it is now to ask you to record your thanks to the President upon his most able address, and to request that he will allow it to be printed and circulated among the Fellows. At this period of the day it is out of the question for me to detain you by making many observations on this Address, so full as it is of matter. It would be a matter of supererogation to touch upon a number of points which he has illustrated by such copious learning of his own. I cannot help alluding to one subject—that is, classical education. I can do no better than sum up my opinion in the words he has himself used. We must distinguish between the superstition and the religion of the classics. These words must be properly considered, as they will be, and you could not possibly have had them better put before you than by Sir Mountstuart Grant Duff, whose words are words of gold, considering the experience and knowledge he has acquired in this and many other matters. I would, however, traverse one observation made—that in the year past no sensational matters have been brought before the Society.

I consider Mr. Bent's discoveries in Mashonaland eminently sensational, and far-reaching in their results. And in this connexion I can only express my regret—a regret that must be shared by every member of the Society—at the death of Sir Richard Burton, than whom no one could have cast more light upon this subject, for none knew more than Sir Richard of these matters. But I must say no more than that we must congratulate ourselves and the Council upon having a President with such zeal, tact, and ability as Sir Mountstuart Grant Duff. He leaves us perfectly satisfied this year as to our position, scientifically and financially. I have to request you to join me in giving him your very cordial thanks.

Mr. GALTON, in seconding the proposal, said:—I have great pleasure in seconding the formal motion that the Address should be printed, being full as it is of those instances of keen insight and happy illustration which gave a widely recognised charm to all the public utterances of our President.

In acknowledging the vote, which was acceded to with applause by the meeting, the President said:—I thank you most warmly for the expression of your good feeling, as I thank the proposer and seconder for the words which they have used. I will not detain you, but should like to say that my not including Mr. Theodore Bent's discoveries under the word sensational was not intended to be any disparagement of his work, to which I attach the very greatest importance, as the results of his journey are among the most interesting things brought before us for some time; but I should not have used the particular word *sensational*.

The meeting then terminated.

* *Ibid.*, p. 333

THE ANNIVERSARY DINNER.

The anniversary dinner of the Society took place in the evening of May 23rd at the Whitehall Rooms, Hôtel Métropole. Sir Mountstuart E. Grant Duff, *o.c.s.i.* (the President), occupied the chair, and the guests included the Italian Ambassador, the Greek Minister, Sir A. J. Adderley, Mr. Moberly Bell, Mr. J. Theodore Bent, M. de Blowitz, Professor T. G. Bonney, Sir G. F. Bowen, Professor J. Bryce, Mr. G. E. Buckle, Sir Fowell Buxton, Sir Andrew Clark, Bart., Maj.-General Colclough, Sir J. Crichton-Browne, Colonel J. C. Dalton, Sir A. Dent, General J. P. D. Donnelly, Mr. Grant Duff, Professor Threlton Dyer, Canon Edmunds, Professor W. H. Flower, Mr. W. Franks, Sir Archibald Geikie, Lord Claud Hamilton, Sir George D. Harris, General J. C. Hay, Sir R. G. W. Herbert, Sir Edward Hertslet, Sir A. Hodgson, Admiral Sir A. H. Hoskins, the Rev. Dr. Jex-Blake, Dr. Kemp, Sir John Kennaway, Lord Kimberley, Lord Lamington, Mr. W. E. H. Lecky, Sir C. C. Lees, Professor Norman Lockyer, General Sir Peter Lumley, General R. MacLagan, Colonel F. J. Maurice, Sir G. S. Messom, Sir Charles Mills, the Hon. J. Munro, Mr. Walter Pollock, Lieutenant-General G. Pritchard, Sir Rawson W. Rawson, Mr. H. Seelohm, Dr. B. Sharpe, General Sir E. S. Smythe, Mr. Henry M. Stanley, Professor Charles Stewart (President of the Linnæan Society), Lord Thurlow, Sir Charles Turner, Sir Thomas Wade, Sir D. Mackenzie Wallace, Dr. G. Watt, Sir Reginald E. Wendy, and Mr. E. Whympere.

The President, after proposing the toasts of "The Queen" and "The Prince and Princess of Wales, the Duke of Edinburgh, and the other members of the Royal Family," next proposed that of "Government and Administration." In doing so he said:—Your Excellencies, my Lords, and Gentlemen,—Every learned Society has a paramount interest in the preservation of ordered freedom at home, so that it may attend undisturbed to its own specialty. There are some societies, say the Chemical and the Astronomical, which make no further demands. They could get on very well if the great machinery of the Legislature and the Civil Service worked perfectly within the limits of our own island, whatever troubles, not immediately affecting our national security, might be raging without. That is far indeed from being the case with the Royal Geographical Society. We have interests in every corner of the planet, and have reason to be peculiarly grateful to those who give their attention not only to domestic, but to foreign, Indian, and colonial affairs. So far as I know, there are only two English statesmen now alive who have been enabled by the accidents of official duty, to become thoroughly acquainted not only with our home affairs, but with the details of foreign, Indian, and colonial business. One of these is with us to-night. I allude, of course, to Lord Kimberley, who, long Under-Secretary in the Foreign Office, and sent as Minister to St. Petersburg immediately after the Crimean War, has studied our foreign relations from within and from without, who has spent years and years at the head of the Colonial Office, and has presided over the destinies of India, showing always the same watchfulness, the same perfect temper, and the same unsurpassed power, first, of patiently considering difficult questions, and then of formulating, with consummate clearness, definite decisions about them. It is, then, peculiarly fitting that I should ask him, in your name, to reply to the toast which I now propose, namely, that of "Government and Administration," under which phrase I sum up all the agencies which enable the Royal Geographical Society to devote itself with good results to those objects for which its founders called it into existence. I give, Gentlemen, the toast of "Government and Administration at Home and Abroad," coupling it with the name of Lord Kimberley.

"The Earl of Kimberley, in responding, said that happily, whatever might be their party differences, they always freely acknowledged in their hearts the excellent services which had been rendered by the men who were responsible for the government of this Empire. He sometimes thought that those who conducted governments scarcely received all the honour due to them. It was an absolute fact, and a very natural one, that the men who lived in history had, on the whole, not been statesmen. Great poets, great warriors, great men of science, had a far longer place in the memory of mankind. If, however, they had not a good civilised government they could have none of the arts or sciences or progress of which they so much boasted. In this country the chief honour was given to those who possessed the rare and brilliant and most agreeable gift of eloquence. There were, however, others who were often called hewers of wood and drawers of water, who had also a great claim on the public gratitude; he referred to the members of the various branches of the public service. Since the times of the Romans no nation had possessed the power of administration and government in a more eminent degree than the nation to which we belonged. Great as was the glory of the poets and the men of science, those who enabled us to make that boast deserved some share of the praise they were willing to accord.

The President next proposed the toast of "The Navy and Army," and said:—Your Excellencies, my Lords, and Gentlemen,—The wisest of Governments and the best of Administrations will be powerless to maintain their place in the world unless they are furnished with good instruments, and, to a country situated like ours, no instruments are more indispensable than a supreme Navy and an adequate Army. Opinions will always differ a good deal as to the amount of force which must be accumulated in a state of immediate readiness for use before we can be said to be in possession of such an Army and such a Navy; but one thing is certain—that, be that force as large as those who demand the *maximum*, or as small as those who demand the *minimum* require, it must be in the hands of soldiers and sailors animated by the best English traditions, and equal or superior in their knowledge of modern war to the best commanders who can be opposed to them. Those even who are most dissatisfied with a great many of our warlike arrangements would agree, I think, that we have many officers of all ranks who are admirably fitted to wield, for the good of the nation, any amount of fighting strength which the nation sees fit to place in their hands. Within the last week or two we have heard of three feats of arms in which very young men—Lieutenant Taylor, Captain Aylmer, Lieutenant Manners-Smith, and Lieutenant McMunn—have conducted themselves in a manner which has reflected upon them the greatest credit. There are many present of all ranks and ages who would, we know, do just as well if the occasion arose; and the governing minds of the services are also admirably represented round this table. I ask you to drink to the Navy and to the Army, including, of course, the Reserve Forces, in connection with the names of two officers of great and varied experience, as well as of the highest distinction—Admiral Sir Anthony Hoskins, and General Sir Peter Lumsden.

Admiral Sir A. H. Hoskins and General Sir P. S. Lumsden replied.

The President then gave the toast of "The Diplomatic and Consular Services, and the Foreign Office." He said:—"Your Excellencies, my Lords, and Gentlemen,—Armies and Navies, however indispensable, will never be put in motion by wise statesmen except in the last resort. Their dealings with neighbouring States will usually be carried on by a very different agency, through the eyes and ears which they have provided all over the planet. If it is desirable that we should have a supreme Navy and an adequate Army,

it is not less desirable that we should have an incomparable Diplomatic Service. In its widest sense that term includes three great divisions—the Diplomatic Service properly so called, the Foreign Office, and the Consular Service. All these divisions should be most intimately connected with each other, and should be as well organised for their beneficent work, that is, for the promotion of peace and good-will amongst men, and for furthering in all honourable ways the interests of their fellow-citizens; as, to use Lord Amthill's happy phrase, "the Prussian Army or the Society of Jesus." Of all these divisions we have excellent examples here to-night. I would connect the Diplomatic Service proper and the Consular Service with the name of Sir Thomas Wade, who, having begun life as a soldier, turned his sword, not into a pruning-hook, but into a pen, and served his country long and well at Peking, becoming in the meantime one of the first of Chinese scholars. I would connect the Foreign Office with the name of Sir Edward Hertslet, who has a more profound acquaintance with diplomatic lore and with the whole literature of his great profession than is possessed by any other Englishman."

This toast was responded to by SIR THOMAS WADE and SIR EDWARD HERTSLET.

The PRESIDENT, in proposing the next toast, which was that of "The Medallists," said:—Your Excellencies, my Lords, and Gentlemen,—I wish that we could have had here to-night both our Royal Medallists; but Mr. Wallace, though he came to our anniversary meeting, has

"been accustomed to entwine
His thoughts with nature rather in the fields,"

than with the festivities of great cities, and we were not able to induce him to be present with us this evening. I had to tell him to-day, when I handed to him our founder's medal, that but for his pre-eminent position as a naturalist, one of my predecessors would long ago have had the pleasure of handing to him the medal of the Royal Geographical Society. The admirers of a man who came so near to ascending the throne which was ascended by his friend Mr. Darwin, had, however, no reason to be surprised if all his other work was thrown into the shade by his achievements in the field of biology. If any omission there were on our part it is now rectified, and we have added another distinguished name to the list of those whom we have delighted to honour. I had a good deal to say this afternoon about Mr. Whymper's services to geography, and I said enough, I think, to more than justify our giving him the patron's medal; but I might have said a good deal more. I might have mentioned that he had brought back from South America collections of the greatest importance; that he had carefully examined the zoology and botany of the Ecuadorian Andes, and had published the whole in a book which will long, I should think, retain an important place in the collections of that most amiable class of persons, the biblio-maniacs, thanks to the perfection of the illustrations, a perfection which they owe to Mr. Whymper's personal and minute superintendence; for he is as distinguished as an artist as he is in his capacity of traveller. In addition to all this, he has given an example to his whole generation, seeing that in a time of heat and haste, when the proper thing for everybody is to be "advanced" without much care whether the advance is towards the Elysian Fields or the blackness of darkness, he has had the self-control to keep back the publication of his results till he had as nearly reached perfection as might be. Horace, we know, advised an incubation of nine years; Mr. Whymper has preferred one of eleven. I have further to congratulate him on having shown the wisdom—must I say of the serpent?—in providing an occupation for himself in other worlds beside this one. He has followed on the steps of Alexander von Humboldt

somewhat critically in this planet; but we know that when that great man was buried two very fine lines were placed upon his tomb:—

“Da er alles umfaßt und erkannt was in Licht sich bewegt hier
Stieg er nun auch in die Nacht, weiter zu forschen hinab,”

which mean, that when he had grasped and comprehended everything that moves here under the light of the sun, he went down into the shades of night to carry his investigations further. He will always be a half-century before Mr. Whympet, and I trust that our friend will have an agreeable pastime for unnumbered eons in rectifying the slips of his predecessor. Before, however, he starts on that long stern-chase, he has, I hope, a great deal of good work to do for geography in this world, and it is with some thankfulness for future as well as for past favours that I ask you to drink the health of the Royal Medallists, and to ask Mr. Whympet to respond for Mr. Wallace as well as for himself.

Mr. EDWARD WHYMPER, in replying to the toast, said:—Mr. President, your Excellencies, my Lords, and Gentlemen,—There was a time, and that not many years ago, when this Society was termed by scoffers the Society of Latitude and Longitude. On looking around at this most distinguished array of representative men, representative—if they will allow me to say so—of earth, air, and sea, of things animal and vegetable, of physics and of physic, whatever this Society may have been in the past, it is clear from this federation of the sciences that at the present broad views of geography animate your councils.

By general consent, the broadening of the aims of this Society has been largely due to the quiet and unobtrusively exerted influence of one we miss to-night; and many, I am sure, besides myself, would have heartily applauded your choice, if you could have seen your way, with Alfred Russel Wallace to bracket Henry Walter Bates.

Whilst highly appreciating, and warmly thanking you for the honour you have done me, I should have been gratified if your award had been made to one who was my friend and councillor for more than a quarter of a century. I am not accustomed to these marks of approbation. You carry back my thoughts forty years, to a long schoolroom, with a dais at one end, bearing piles of gilt-edged books, which were distributed to boys in jackets with some such words as these:—“Master John Smith, this book is presented to you in recognition of your improvement in geography, and in the hope that it will prove an incentive to future exertions.”

Even in those early times I was an explorer, and Sir Joseph Hooker, if he were present, would be glad to know that some of my expeditions showed a strong botanical bias. I have a lively recollection of one of them, on which I wished to study the fruit of the apple *in situ*, and to attain that end climbed into an apple tree. But, unfortunately, my motives were misunderstood, and I received—no, I will not tell you what I received, beyond that it was *not* intended as an incentive to future exertions.

Owing to reveries which overtook my family in consequence of the Crimean War, I was removed from school at an early age, and was saturated with art at a time when I ought to have been artless.

I remember hearing, some years ago, in an after-dinner speech, an eminent public man, who afterwards became Governor of Madras, declare that as he had had the disadvantage of an University education, he knew little of science and nothing of art. When you, sir, made use of those words at Willis's Rooms, you did not, perhaps, foresee that you would be reminded of them at the Hôtel Métropole, when occupying the presidential chair of the Royal Geographical Society. I could not entirely follow you, for it must be remarked that many University men take degrees

in Arts. They become B.A.'s, M.A.'s, and even P.A.'s, and this implies considerable progress both in arts and knowledge.

When I was released from my bondage to art, I became a student again, in the school of nature. Chance seemed to give a direction to my studies, and in a short time, whilst still a very young man, shunning rather than courting publicity, I found himself pointed to as "the embodiment of the maximum degree of folly that a human being can attain." For the last thirty years I have been accustomed to this description of flattery, and until quite recently it does not seem to have struck anyone that the "Mountain-maniac" who addresses you could possibly have cared for geography.

Though it is indeed true that I have done but little for your science, I would gladly have swept the seas to have discovered a new continent, or pushed my way through a primeval forest to rescue a captive princess, provided always, as the lawyers say, that she would have been willing to return with me.

Really great journeys must, however, become more infrequent as the unknown areas become more circumscribed. The great ones which still remain to be made in the East and the West, in the Arctic and Antarctic, one would almost be inclined to deem beyond the reach of private enterprise if it had not been shown in recent years that scarcely anything is impossible to the supreme daring of a Nansen and the indomitable will of a Stanley.

Sooner or later, the great—that is to say, the very extended—journeys must come to an end. Sooner or later, gentlemen, you will have to set your affections upon things which are on high. The exploration of the mountainous regions of the world has scarcely commenced. It will afford occupation for generations of travellers, and I do not doubt that the attention of your Society will be more and more concentrated upon this description of exploration, and that a century hence, far from finding it exhausted, you will declare that it is *inexhaustible*.

Gentlemen, my longitude has been limited, and my time has expired. I resume my seat thanking you for your reception; thanking you on my own behalf and upon that of my colleague for the honour you have done us; and assuring you that in the future we shall, as in the past, endeavour by such means as are in our power to promote the progress of geographical science, and the welfare of the Royal Geographical Society.

The PRESIDENT next proposed "The Allied Sciences and Sister Departments." He said:—Your Excellencies, my Lords, and Gentlemen,—As Geography rules the whole domain in which the sciences connected with things having life meet the sciences connected with things not having life, it follows that its connections amongst other sciences are very wide and far-reaching. It is closely connected with all human history; it is closely connected with the art to which man, ever since he appeared upon this planet, has given such an enormous amount of attention—the art of war. One of its own departments, indeed, is known as military geography. It is closely connected with zoology, geology, mineralogy, and no less closely with botany; while from the very earliest times its obligations to astronomy have been of the greatest and most varied kind. I desire to thank, in the name of our Society, all those sciences for the help which they have given, and will give us, and, in doing so, I would join the name of History with that of Mr. Bryce, who has always emphasised the close connection between his science and that which brings us hither to-night. I would join Military Geography with the name of a distinguished officer who, I may say, I think, without fear of contradiction, has written far the most valuable treatise on the art of war which has appeared in our language—I mean Colonel Maurice. I would join Zoology, Geology, and Mineralogy with the name of Professor Flower, who so well presides

over the great Natural History collections of the British Museum. I would join Botany with the name of Mr. Dyer, who is at the head of a magnificent institution, whose influence is felt strongly in every corner of the British Empire, and far beyond its limits; while with Astronomy I would join the name of Mr. Lockyer, who has long been lord-pam-mountain of the sun, and has recently, by his excellent work on physiography, come into very close relations with our immediate pursuits. I give you accordingly "The Allied Sciences and the Sister Departments."

This was acknowledged by Mr. BRYCE, M.P., Colonel MAURICE, Professor FLOWER, Mr. W. T. THIRSKTON DYER, and Professor NORMAN LOCKYER, the last of whom said that, while everyone knew that one of the main bases of geographical science lay in astronomical observations, without which all maps would be impossible, many might not know that a good deal of astronomical work relied as much on the labours of geographers. The preliminary surveys that were being made for the observation of the total solar eclipse next year might be cited as one proof of this. He congratulated the Royal Geographical Society on the new *climatic* now growing up about it in the way of physiographical study.

The toasts of "India" and "The Colonies," proposed by Mr. H. SEEDORF and Sir GEORGE F. BOWEN respectively, were coupled with the names of Sir Charles Turner and the Hon. James Munro.

The ITALIAN AMBASSADOR acknowledged the toast of "The Guests," briefly advertising to the interests that England and Italy had in common.

Mr. LECCKY proposed "The Royal Geographical Society and its President." Such a body, he said, had a special hold on the English nation. As for the President, it was a happy fortune that he who was first widely known for his admirable surveys of the political conditions of the great countries of the world should be now presiding over a Society beyond all others cosmopolitan in its range.

Sir M. E. GRANT DUFF having replied, the guests separated.

REPORT OF THE EVENING MEETINGS, SESSION 1891-92.

Twelfth Meeting, 20th June, 1892.—The Right Hon. Sir M. E. GRANT DUFF, G.C.S.I., President, in the Chair.

LECTIONS.—William John Archer, Esq.; Lieut. Geo. Cave, R.N.; Humphrey Chamberlain, Esq.; William Astor Chanler, Esq.; Frederick A. Edwards, Esq.; Robert Charles Kessler, Esq.; Rev. Harry Ernest Ketchley; Rev. E. Orlando Kner; Rev. Joseph Lawson Rogers; Algernon Sidney Rose, Esq.; Lieut.-Colonel Trotter, R.A.; Vernon Oke Woods, Esq.

PRESENTATION.—Rev. Thomas Hammond.

The paper read was:—

"Columbus; His Life and Discoveries in the Light of Recent Research." By Clements R. Markham, Esq., F.R.S., F.R.S.

There was an exhibition of photographs and maps in the tea-room.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Berlin.—May 7th, 1892: Baron von RICHTHOFEN in the Chair.

DR. BUTTNER'S TRAVELS IN TOGO LAND.

Dr. R. Buttner read a paper upon his journeys in Togo Land, which he explored in 1890-91 in the interests of botany and zoology. Although his collections have not yet been completely worked out, the interesting fact has been established that in the steppes and river woods of this country some European birds of passage, such as the hoopoe, the wry-neck, the shrike, and several kinds of wagtails, are met with as winter visitors. Adeli, the country in which the station of Bismarckburg is situated, is a rocky mountain region, the inhabitants of which are too poor to keep slaves for the cultivation of the soil. They waste their time in everlasting palavers with fetishes, and prefer collecting india-rubber to working in the fields. The Adeli villages are small and mean-looking, and contain only isolated huts. At a distance of one day's journey east of Bismarckburg, and on crossing the Angae River, the traveller enters a totally different region. The Anyanga country is flat: the villages contain a numerous population, and cover a large extent of ground. The huts have farms adjoining them, and stable buildings for the cattle. Anyanga is the country of swine-breeding—a surprising number of these animals being reared there. North of Anyanga no trace of swine is found, obviously in consequence of the influence of the strong Mohammedan element. Here, in the countries of Chautyo and Fasugu, cattle-breeding is extensively carried on, herds numbering 200 or more being frequently met with. The traveller observed four different kinds of cattle. In Chautyo, horse-breeding is of greater interest. There are two descriptions of horses reared—a small kind of pony, and a larger horse, which is used almost exclusively in war. There are also really good asses and mules. The road to Paratan, the chief town of Chautyo, crosses at Kokos the great caravan route, which leads from the Hausa territories to the Volta, and along which many thousands of traders pass every year. Here the traveller comes upon farms extending for miles. The whole region is very carefully cultivated, and the people are out at work upon the fields before daybreak—not only the slaves, but the farmers, their wives, and children. In all the larger villages of the countries bordering on the great Hausa routes there are Mohammedan priests, called "lmam," who have ingratiated themselves with the chiefs, and who play an important part in the affairs of the country. Originally their position was that of priests to the passing caravans. Their influence has been such that many Hausa people have permanently settled in the country, and the better classes of the population have themselves become Mohammedans, or at any rate have adopted Mohammedan customs. The use of alcohol in the form of rum, palm wine, and beer, is the only thing that the powerful Mohammedan influence has not been able to abolish. After a two years' stay at Bismarckburg, Dr. Buttner commenced, in the autumn of 1891, his return journey to the coast, passing through the Tribu and Buem country, which had not before been trodden by the foot of the white man. The large Buem villages have a central street, with shady trees and seats. Rice is much cultivated here. Travelling through a very impracticable mountain region, the villages of which are composed of four-sided mud huts, with flat mud roofs, Dr. Buttner journeyed from Bumda, the chief town of Buem, to the German station of Misahöhe, and thence to the coast.

A WINTER IN LAPLAND.

Herr Raschin then read a report upon a winter spent in Bossekop (Lapland), where he, with Dr. Brendel, passed the winter of 1891-92 for the purpose of studying the *Aurora borealis*. Twice a week in the winter the mail steamer runs between Trondhjem and Vadsø, in order to supply the towns and villages with the necessaries of life. Between Trondhjem and Hammerfest this steamer calls at more than sixty stations; and since, in consequence of the dangerous channels, navigation is only possible by day, this voyage occupies ten whole days. Bossekop, a village of 200 inhabitants, mostly Lapps, is the most important place on Alten Fjord, and an old centre for observations on terrestrial magnetism. In 1838-40 a French expedition stayed here; and in 1882-83 Bossekop was the Norwegian station for international polar exploration. Dr. Brendel succeeded in taking some photographs of the various appearances of the Aurora. On February 14th, 1892, on the occasion of an exceptionally bright appearance of the Aurora, the Expedition observed, about two o'clock a.m., within eight minutes, a change of the magnetic declination of more than 12° , which is by far the greatest disturbance of declination which has hitherto been recorded. The temperatures on the northern coasts of Norway in winter are very remarkable, being directly connected with the distance of a point from the coast. In the interior of Lapland, lower winter temperatures prevail than under the same latitudes in Western Greenland. Thus, the lowest winter temperature at Gjesvår, near the North Cape, was -2° (Fahr.); at Bossekop, lying more south, but 45 miles away inland, it was -22° (Fahr.); and at Karasjok, 125 miles from the coast— -60° (Fahr.). At the beginning of March a great fair is held at Bossekop, at which the Lapps from miles round attend, to barter reindeer flesh and ptarmigans for flour, fish, tobacco, and brandy. At this year's fair 11,500 ptarmigans, 350 hundredweight of reindeer meat, 1000 reindeer tongues, and 110 hundredweight of butter, were sold.

The Chairman, Baron von Richthofen, then referred to the various undertakings of the Society now in progress. After mentioning Dr. Drygalski's Expedition, he stated that the Society will publish, as a souvenir of the 400th anniversary of the discovery of America, a splendid work, edited by Dr. Kretschmer, which will contain studies on the old manuscripts and maps in the Italian libraries, having relation to the history of the discovery of America. The work, towards which the German Emperor has promised a contribution of 15,000 marks, will be accompanied by an atlas, which will contain 35 large maps, 31 of which are new, and will be published for the first time.

NEW GEOGRAPHICAL PUBLICATIONS.

(By HUGH ROBERT MILL, D.Sc., *Librarian, R.G.S.*)

EUROPE.

Aggéeenko, A.—The Flora of the Crimea, Part I., being a geographical and botanical sketch of the Peninsula. *Memoirs of the St. Petersburg Society of Naturalists,* vol. xxi., 1891, Botany. (In Russian.)

Under the above title we have a very valuable geographical sketch of the Crimea. The first chapter treats of orography, rivers, climate, soil, and vegetation. An historical review of botanical exploration in the Crimea also contains

valuable geographical data. In the third chapter the geographical and botanical features of the Steppes, the northern slope of the mountains, the plateaus of the highlands, and the southern slope are analysed at some length. The influence of men and of animals upon vegetation is next discussed. A list of new species is given in an appendix. The work is illustrated by a most welcome geographical map of the Crimea, on the scale of 12·6 miles to an inch.—[P. K.]

Jakoby, A. J.—The Kanin Tundra. 'Memoirs of the Kazan Society of Naturalists,' vol. xxiii., fasc. 1. Kazan, 1891: 8vo, pp. 79, map. (In Russian.)

The author has explored the western coast of the Kanin peninsula, and the highlands of the northern coast. His report contains interesting facts relative to the vegetation of the tundra, and an account of the Samoyedes, their reindeer herds, and the invasion of the mainland Samoyedes into the peninsula. Some experiments as to the vaccination of reindeer against anthrax have been made. The map, compiled by the Mezen forester, M. Trofimenko, is the more valuable, as the old maps of the general staff are reported to be very incorrect.—[P. K.]

Levasseur, E.—Superficie et Population des Etats de l'Europe. *Revue de Géographie*, 1892 (June): 401–407.

Paper read before the Académie des Sciences, in the 'Comptes Rendus' of which it also appears. See *Note* in this number.

Main [Mrs.], E.—My Home in the Alps. London, Sampson, Low, Marston, & Co., 1892: small 8vo, pp. 131. Price 3s. 6d. [Presented by D. W. Freshfield, Esq.]

A pleasantly-written account of life in the high Alps, with appreciative anecdotes of guides and mountaineers.

[Murray's Handbooks.]—The Handbook for Travellers in Spain. By the late Richard Ford. Revised and corrected. Eighth edition. London, John Murray, 1892: post 8vo, pp. xi. [80] and 569, maps and plans. Price 20s.

The present edition of the 'Handbook for Spain' is divided into two parts. Part I.—Madrid and the Castiles, the Basque Provinces, Leon, Asturias, and Galicia. Part II.—Extremadura, Andalusia, Murcia, Valencia, Catalonia, Aragon, Navarre, and the Balearic Islands. Of its well-proved utility and practical value it is unnecessary to speak.

[—].—Handbook for Essex, Suffolk, Norfolk, and Cambridgeshire. Third edition. London, John Murray, 1892: post 8vo, pp. [78] and 462, maps and plans. Price 12s.

This edition has, it is stated, been carefully revised on the spot. It is well supplied with maps, and contains three plans of important towns.

ASIA.

Bernier, François.—Travels in the Mogul Empire, A.D. 1656–1668. A revised and improved edition, based upon Irving Brock's translation by Archibald Constable. Westminster, Archibald Constable & Co., 1891: 8vo, pp. lii. and 500. Maps and illustrations. Price 6s. nett. [Presented by the Publishers.]

No handsomer reprint of a book of travels has hitherto been produced at a price even many times greater than that of this introductory volume of Constable's *Oriental Miscellany*. The translation of Bernier's original work is admirably done, and the editor has added a series of useful notes. There are prefixed a table of the principal events of the life and times of the author, and a bibliography of his works. The illustrations include copies of the original maps, and a remarkable reproduction, in gold and colours, of a painting of Shah Jahan by a contemporary artist.

Chisholm, George G.—*Longman's School Geography for India and Ceylon.* London, Longmans, Green, & Co., 1891: 8vo, pp. 364. Price 3s. 6d. [Presented by the Author.]

Mr. Chisholm's excellent school geographies are happily well known, and this volume, in which the portion describing British possessions in Asia is thrown into prominence, is worthy of its predecessors. Apart from the alterations which adapt the book for use in Eastern schools, the whole work appears to have undergone careful and very thorough revision.

Kennan, George.—*Siberia and the Exile System.* London, Osgood, McIlvaine & Co., 1891: 2 vols, 8vo, maps and illustrations. Price 32s.

The aim of this book is "to give a clear and vivid impression of the scenery, the people, and the customs of Siberia, and to record the results of a careful study of the exile system." Mr. Kennan's account is certainly clear and vivid, but it refers mainly to that portion of Siberia which lies between 55° and 50° N. lat., and as far east as 120° E. long.; while his study of the exile system seems to be chiefly an exposure of its abuses. The author left St. Petersburg for Siberia on May 31st, 1885, and returned on March 19th in the following year. The route chosen was that usually taken by the convict gangs—*via* Ekaterinberg and Tiumen to Omsk, thence down the Irtysh River to Semipalatinsk, where Mr. Kennan left the direct route in order to visit the Altai mountains. He reports the scenery of this district to be indescribably beautiful, with enchanting valleys and magnificent snow-clad mountains not to be compared to any Alpine scenery known to him. Throughout this mountainous region there is a peculiar trade in the horns of the *maral*, or Altai deer, which are eagerly sought after by Chinese traders for medicinal purposes. The beauty and richness of the flowery plains of Tobolsk are graphically described. The country is readily cultivated, and has immense natural resources. If immigration were only free Mr. Kennan thinks that these plains might rival the great wheat-growing States of America. From the Altai mountains the route taken was by Barnaul and Tomsk to Irkutsk. An interesting reference is made to the Angara River, which in midsummer is the coldest of all the Siberian rivers, and yet is the last to freeze in winter; indeed, it is never entirely closed. After crossing Lake Baikal, Mr. Kennan diverged to the south in order to visit the Selenginsk Lamasary, where he had an amusing interview with the grand lama, whose geographical ideas were quite upset by proofs of the earth's sphericity. Having passed the Yablonoï range, the traveller made direct for his destination—Kara. Here he inspected the gold mines, the annual yield of which is about 400 lb. The "mines" are superficial diggings, and earth to the depth of only a few feet needs to be removed in order to reach the gold-bearing gravel and sand. The return journey from the Trans-Baikal was begun in the depth of winter by a visit to the Nerchinsk silver mines. In these mines work is carried on in a most primitive fashion; the shafts and galleries are badly constructed, and often positively dangerous, the atmosphere injurious, and so feebly are the mines worked that the two richest only yield 1440 lb. of silver per annum.

On the home journey Mr. Kennan had frequently to drive over plains where the snow was frozen in waves measuring from four to five feet from trough to crest; in one place the river, being frozen lower down, had its waters dammed back on to the road, forming an impassable mountain of ice blocks.

The greater part of the two volumes is occupied with an account of what Mr. Kennan saw and heard of the exile system. Mr. Kennan writes simply and earnestly of what he saw, and is for the most part content to base his conclusions on the official Russian reports. He concludes that the indifference and dilatoriness of the Government are the causes of the condition in which he found the forwarding prisons and the wayside *étapes*. The book has many illustrations from photographs and sketches by Mr. Frost, who accompanied Mr. Kennan, and if the maps are not elaborate they are at least sufficient for their purpose.

Le Clercq, Jules.—*Voyage au Mont Ararat.* Paris, Plon, Nourrit et Cie., 1892: 8vo, pp. 328. Price 4 fr. With sketch-map of route.

M. Leclercq gives a pleasant account of his journey from Tiflis to Mount Ararat, with some description of Erivan, and considerable details regarding the monastery, churches, and traditions of the holy town of Etschmiatzen. The object of the journey was to ascend Ararat, but in this the author was unsuccessful. Misled by the easy ascent of some Russian students a few years previously, he made no adequate preparation for mountaineering, not even providing himself with an alpe stock. After some trouble with the commander of the Cossack regiment at Sardar-bulakh, he set out without military escort, accompanied by an interpreter, three Armenians, and five Kurds, and slept in the open air, on the slope of the Cone of Massis, at an altitude of 12,750 feet, the temperature falling to 23° Fahr. In consequence of the want of any shelter, M. Leclercq had a feverish attack, and could not eat, and next morning, after struggling to a height of 15,620 feet, he was compelled to return, having been within 1440 feet of the summit. In the circumstances it is surprising that he accomplished so much. A dispute with the Kurdish porters regarding payment nearly led to serious consequences. The author speaks well of the Armenians, although acknowledging that the mass of the people has greatly deteriorated in moral qualities under Turkish oppression.

AFRICA.

Distant, W. L.—*A Naturalist in the Transvaal.* London, R. H. Porter, 1892: with coloured plates and original illustrations, 8vo, pp. xvi. and 277. Price 21s.

Keen observational powers, and enthusiasm as a zoological collector, make Mr. Distant profit more than most men could by a year's sojourn in a foreign land. In the 148 pages which summarise his travels in the Transvaal, he records many interesting facts of men and things; his observations on Beers, Kadirs, Cockies, and prospectors, although cautious, are highly descriptive. It seems that in the Northern Transvaal the native smiths who smelt iron from ore, and fashion agricultural implements in primitive furnaces and by means of stone hammers and anvils, still held their market against the competition of cheaper Birmingham tools. The copious appendices containing reports by specialists on Mr. Distant's collection are scientifically the most valuable part of the book. A melancholy interest invests the volume from the fact that it was the last (the last of a very long series) which the late Mr. H. W. Bates revised in proof, "the last of the many friendly offices he undertook to aid his favourite study and to oblige his friends."

Monnier, Marcel.—*Un Voyage en Guinée.* Bulletin Soc. de Géog. Commerciale de Havre, 1892: 115-128.

Description of the harbour, town, and commerce of Assini.

Schlichter [Dr.], Henry.—*The Pygmy Tribes of Africa.* Scottish Geographical Magazine, VIII. (1892): 289-301.

A critical discussion of the discovery and habitat of the dwarf tribes of Africa.

White, Arthur Silva.—*The Development of Africa, a study in Applied Geography.* London, George Philip & Son. Second edition, 1892: 8vo, pp. xiv and 307. Maps. Price 7s. 6d. [Presented by the Publishers.]

This new and cheaper edition is brought abreast of recent African changes. Mr. Ravenstein's fourteen admirable maps are contained in it: and the general reader, for whom it is intended, is well provided for. Mr. White's recent calculations designed to give a numerical value to the utility of Africa are referred to in the book, but not included. For notice of the first edition see 'Proceedings,' XIII., p. 55.

AMERICA.

Brinton [Dr.], Daniel G.—Observations on the Chinantec Language of Mexico, and on Mazatec Language of Mexico and its affinities. Proceedings of the American Philosophical Society, XXX. (1892): 22-40.

Carranza [Dr.], L. Meteorología y Climatología del Perú. Boletín de la Sociedad Geográfica de Lima, I. (1892): 392-413.

Includes a discussion of the effect of the Antarctic current on the coast climate of Peru.

Heilprin [Prof.], Angelo.—The Temperate and Alpine Floras of the Great Volcanoes of Mexico. Proceedings of the American Philosophical Society, XXX. (1892): 4-22. See Note in this number.

Hudson, W. H.—The Naturalist in La Plata. With illustrations. London, Chapman & Hall, 1892: 8vo, pp. 368. Price 16s. [Presented by the Publishers.]

Geographically the value of this book would be looked on as somewhat indirect by those whose only conception of geography is the topographical delineation of unknown regions. But in the wider modern framework of geography it fills an important place. Mr. Hudson has lived from childhood on the pampas, and knows their every phase and feature. From childhood he has studied the beasts and birds and plants of the vast plains which roll between the Paraná and the Rio Colorado of Patagonia. He is already known as an authority on Argentine birds, and the present volume deals rather with the physiographical than the systematic study of life. He notices as remarkable, that in a country so specially suited for ruminants, there should be naturally but one member of that family. Many of the animals are evidently immigrants from forest or mountain, judging from the curious persistence of features and instincts entirely unsuited to their present surroundings. From careful observations, Mr. Hudson concludes that some of the birds which winter in La Plata and Patagonia breed in the Arctic regions in as high latitudes as 82° N., thus crossing the equator in their annual migration. Other birds, he believes, migrate to the Antarctic continent. The book, abounds with capital anecdotes and powerful descriptions, that of the huanaco's "dying place," in Southern Patagonia, being specially worthy of remark. Yet Mr. Hudson is not a mere story-stringer; he leads up always from the facts, which he describes with peculiar freshness and charm, to general laws and wide conclusions. In some instances he contravenes, with considerable show of reason, several generally accepted doctrines of Darwinian evolutionists.

La Combe, Ernesto de.—Expedición al Rio Azupiza. Boletín de la Sociedad Geográfica de Lima, I. (1892): 414-440. With a map.

Historical notes on the crossing of the Andes by the Tarma road, account of the inspection of the new road from Chicla to the Rio Pichis, and general conclusions as to increased facility of communication between the coast and trans-Andine provinces of Peru.

La Puente [Dr.], D. Ignacio.—Estudio monográfico del Lago Titicaca. Boletín de la Sociedad Geográfica de Lima, I. (1892): 363-391.

An account of the geographical position, physical condition of the water, and the geology of the surroundings of Lake Titicaca, with details concerning the islands in the lake, including their flora.

Packard, [Dr.] Alpheus Spring.—The Labrador Coast. 8vo, pp. 514, maps and illustrations. New York, N. D. C. Hodges, 1891. Price \$3.50.

Two summer cruises in 1860 and 1865 form the nucleus around which Dr. Packard has elaborated a description of the coast of Labrador, and a history of such exploration as has been done in that uninviting land down to the re-discovery of the Grand Falls in 1891. The maps contain some new delineation of the northern coasts of the peninsula, derived largely from the

observations of the Moravian missionaries. But the mechanical production of the maps is most disappointing; they are printed from process-blocks, which are neither clear nor attractive. The geology of Labrador is described in some detail. Gneiss and the older volcanic rocks are everywhere the basis, but great quaternary deposits also occur. The fjords are specially interesting on account of the evidence they afford as to their formation. In almost every case they occur at the junction of two rock formations, usually where syenites rise through the gneiss. The primitive fissures, or faults, in which the fjords lie, show marks of subsequent glaciation, and the innumerable small lakes of the interior seem wholly of glacial origin. Sharp raised-benches run parallel to each other along a great part of the coast, but that this is not unequivocal proof of elevation being still in progress appears from Dr. Packard's discovery of submerged terraces, in profile exactly resembling ordinary raised benches, lying 50 fathoms below the sea surface. The flora and fauna, both terrestrial and marine, are treated at some length. A large part of the book is occupied with the question of early voyages and first discovery. Dr. Packard brings forward evidence to show that Biarné in 990 first sighted Labrador on his way to Greenland, although Kohl considers the point of departure from America to have been Nova Scotia. After him came Leif Erikson, whose Helluland was probably Labrador, and not Newfoundland, as Kohl supposes. There seems no reason to doubt that all Labrador was, at an early period, inhabited by the Eskima, who were subsequently driven northward by the Indians, and are now confined to the treeless region of the far north. A bibliography of 27 pages, which might be made more complete, and a full index, conclude this useful book of reference.

Tapajós [Dr.], Torquato.—O Amazonas e a França; Revista Sociedade de Geographia do Rio de Janeiro, VII. (1891): 255-270.

An account of rival Brazilian and French claims in Guiana.

GENERAL.

Berger, Hugo.—Geschichte der Wissenschaftlichen Erkunde der Griechen. Dritter abtheilung. Die Geographie der Erdkugel. Leipzig, Von Veit & Co., 1891: 8vo, pp. xii. and 158. Price 4m. 50.

Dr. Berger's laborious study of the development of geography amongst the ancient Greeks, of which this volume forms the third part, is a valuable contribution to organised knowledge. The first part, published in 1887, dealt with the geography of the Ionians, and the second, which appeared in 1889, dealt with the subsequent development down to the time of Aristotle. The present volume states the advances in systematic geography which accompanied and followed the campaigns of Alexander the Great. Its five chapters critically summarise the contributions to geographical science of Pytheas, Dicaearchus, Eratosthenes, Krates Malotes, and Hipparchus.

Chisholm, George G.—Handbook of Commercial Geography. London, Longmans, Green, & Co. Third edition, 1892: large 8vo, pp. xii. and 515. Price 10s. nett. [Presented by the Publishers.]

The substantial merits of this work were pointed out on the appearance of the first edition, three years ago ('Proceedings,' XL, p. 635); and the rapid sale of the book shows that it is appreciated and accepted by the public. In his preface Mr. Chisholm defines the purpose of his book, and indeed of all small volumes dealing with great subjects. "Many appear to think that the main function of such a work is to furnish information as to new profitable markets. Now, I do not question that geographical studies may help greatly in arriving at such information; but the studies carried on with this view must be minute and exhaustive. To comprehend the whole world in such a survey would require an encyclopædia, not a volume. A volume dealing with the subject must, it seems to me, be essentially educational. Its function is to make the mind active and suggestive in matters connected with one's business. The benefit derived from its study is indirect." The revision throughout is thorough, and many improvements are introduced.

Mill [Dr.], H. R.—*The Realm of Nature*. London, John Murray, 1892: 8vo, pp. xii. and 370. Price 5s. [Presented by the Publisher.]

This work is an attempt to give a condensed and compendious summary of the present state of our knowledge of the earth, its structure, surroundings, and contents. Dr. Mill includes in his scheme Cosmography, so far at least as an outline of it is needful to an appreciation of our planet's place in relation to our solar system and the universe. In this connection he takes the earth as his starting-point. But for the rest he is not to be classed as a follower of the system popularised by Professor Huxley, which works from the local and familiar to the general, and frames manuals as texts to explain object-lessons. Such lessons are no doubt invaluable, and have their proper place in all thorough teaching. But surely the imagination of the young is still equal to the older and more stimulating method, which did not shrink from the direct enunciation of general laws and sequences. In another respect, Dr. Mill is commendable for not giving way to fashion. He has, it is true, a pretty taste in examples, and uses them often with much success. But he shrinks from the levity of some lecturers who do not hesitate to compare the sublime with the trivial, to lighten their facts and figures by comparing the infinitely great to the infinitesimally little.

Dr. Mill defines nature as "all creation, with its chances," and physiography as the description thereof. Such a definition might seem to include the sensations and notions of the human mind. The author consequently finds it expedient to insert a special and somewhat quaint apology for the omission of theology from his pages. Any discussion on these and similar matters would be out of place here. Moreover, even to follow Dr. Mill over the "realm of nature" would be impossible in any reasonable space. Such a work should serve the ordinary critic rather as a warning of the shallowness of his own knowledge than as an opportunity of showing its superficial extent.

Dr. Mill has imagination and grasp; he is not a mere grinder out of terms and phrases, but a clear-headed student. He shows to best advantage in the more difficult part of his field, among the abstruse problems of physiography, geology, and meteorology. He is particularly at home on the ocean, and devotes almost a disproportionate space to water. When it takes the form of ice, he is naturally under the influence of the Scotch school of geologists. But as a rule he steers clear of partisanship in matters of doubt.

Dr. Mill is, perhaps, less sure in his handling of the laborious and somewhat mechanical task of sketching the relief of the earth's surface—putting a map on paper. No man can do this thoroughly—at any rate, until contour maps are far more generally constructed and used—unless perhaps a globe-trotter of rare intelligence. Old geographers talked of the St. Gotthard group as the central point of the elevations of Europe. Dr. Mill assigns the Pamir the same importance in Asia. Is not this mere fancy? In treating of volcanic action, the more conspicuous extinct as well as active volcanoes might well be emphasized. One more criticism. Dr. Mill might, we think, with advantage revise his definitions of geography and historical geography; geography deals with the earth's surface, in itself as well as in relation to men; historical geography surely is more than the story of the changes in frontiers; it includes the influence of their surroundings on peoples, on their migrations, and also on their civilisations.

The book is largely illustrated with maps and diagrams, for the most part as good, apparently, as the scale will allow. It is eminently one for the use of teachers and the private study of higher scholars, and there is probably none better of its kind, at any rate in our language. We have no doubt that in future editions Dr. Mill will make it better still. Such faults as we have noticed are of a kind easily removable.—[D. W. F.]

Oppel [Dr.], Alwin.—*Terra Incognita*. Eine kurzgefasste Darstellung der stufenweisen Entwicklung der Erdkenntnis vom Ausgange des Mittelalters bis zur Gegenwart. Bremen, M. Nöcker, 1891: 8vo, pp. 68. [Presented by the Author.]

An account of the gradual discovery of the earth's surface since the close

of the fourteenth century to the present time. In conclusion, there is an estimate of the area still unexplored. Thus Dr. Oppel states as follows: 2,123,000 square miles in the Arctic regions, 1,282,000 in lands bordering on the Arctic circle, 488,000 in North America, 1,190,000 in South America, 2,762,000 in Africa and Madagascar, 1,151,000 in Asia, 1,513,000 in Australia and New Guinea, and 8,268,000 in the south Polar regions. Of this area 5,013,000 square miles lie between the tropics.

Ratzel. [Dr. Prof.] **Friedrich.**—*Anthropogeographie. Zweiter Teil, Die geographische Verbreitung des Menschen.* Leipzig, 1891. Price 16m.

In the first volume of this work, Professor Ratzel discussed the physical features of the earth's surface and their influence on man, showing how different forms of settlement and civilisation were conditioned by differences in surroundings, whether of a physiographical or climatological nature. He spoke of the endless variety to be found within the human race.

In the second volume he works out his idea of a biogeography as the real geography, based on the essential unity of the human race. In the first of the four sections into which the volume is divided, the author discusses the outlines of the geographical picture of the human race. He speaks of the inhabited and habitable parts of the globe, the *oikoumene* of the ancients, discusses the gradual extension of man's idea of the size of the world, and shows how nations have been influenced in their development, not only by actual physical features, but by the place they occupy within the *oikoumene*. In the second part he deals with the statistical aspect of mankind, discussing the distribution of population, the relation between density of population and civilisation, and gives two chapters to the consideration of those races which have remained in a backward state of civilisation, discussing the fact of their gradual extinction when brought into contact with more highly civilised peoples, and also the fact of what he calls their self-annihilation when left to themselves. The third section treats of the changes wrought on the earth's surface by the hand of man, of the nature and distribution of settlements, of the artificial ways of communication which have been constructed to supplement those provided by nature. Lastly, he discusses the value to anthropogeography of ethnographical characteristics.

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Hölzel, Ed.—A Magyar Korona Országainak Iskolai Fali-Térképe. A vallás-és közoktatásügyi m. kir. miniszter megbízásából, tervezte és rajzolta: Kogutowicz Manó; az eredeti adatokkal összehasonlította Lőczy Lajos egyetemi tanár. Kiadja Hölzel és Társa Magyar Földrajzi Intézete Budapesten. 1891. Scale 1:600,000, or 8·2 geographical miles to an inch. 4 sheets. [Presented by the Author.]

This is a school wall-map of Hungary, prepared by the Author under the auspices of the Hungarian Geographical Institute. It is coloured to

clearly the physical features and boundaries, and is furnished with notes in the Hungarian language, explaining the system of colouring and the meaning of the symbols employed in its construction.

Thüringerwaldes. Die Waldungen des —, von Dr. Fr. Regel.—Scale 1 : 208,000, or 2·8 geographical miles to an inch. Deutsche Geographische Blätter. Band XV. Tafel I. Kommissionsvorlag von G. A. v. Halem in Bremen. [Presented by Dr. M. Lindemann.]

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Indian Government Surveys:—

Indian Atlas, 4 miles to an inch. Quarter sheets: 22, N.E. Parts of Districts Ahmedabad, Kaira, and Panch Mahals, of Native State Baroda, and of Mahi Kantha and Kathiawar Agencies (Bombay Presidency). 35, N.W. Parts of Oudypore, Gwalior, Tonk, and Indore (Native States Rajputana and Central India Agencies). 42, Parts of Districts North Canara and Dharwar (Bombay Presidency) and Nizam's Dominions.—Map of India, showing Feeders to Railways [Roads and Navigable Canals], 1889-90. 1 inch to 32 miles. 6 sheets. With additions to railways to 1890.—Bombay Survey, 1 inch to a mile. Seasons 1887 to 1889. Sheet 277, Districts Kārwar, Belgaum, and Dhārwar. Sheet 333, Districts Bijapur and Dhārwar. Central India and Rajputana Survey. 1 inch to a mile. Seasons 1854 to 1876. Sheet 253, Parts of Districts Rehtak and Gurgaon, and Native States Nabha, Patiala, Jind and Dajana (Punjab), and of Jeypore Native State (Rajputana). 284, Parts of District Gurgaon, and of Native States Patiala and Nabha (Punjab), and of Jeypore and Udwur (Rajputana). 338, Parts of Native States Bhurtore and Udwur (Rajputana), and of Districts Gurgaon (Punjab) and Muttra (N.W. Provinces). 339, Parts of Bhurtore and Udwur Native States (Rajputana), and of District Muttra (N.W. Provinces). 362, Parts of District Agra (N.W. Provinces), and of Native States Bhurtore and Dholpur (Rajputana Agency). 368, Part of Native State Gwalior (Central India Agency). 390, Parts of Gwalior Native State (Central India Agency), District Saugor (Central Provinces), and District Jhans (N.W. Provinces). 392, Parts of Native

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Seondurbans, 1872. 4 miles to an inch. With additions and corrections up to 1891, 2 sheets.—Rajshahi Division, comprising the Districts of Rungpore, Dinagepore, Bogra, Rajshahi, Pubna, Jalpaiguri and Darjeeling, and the Native State of Cooch Behar. 1 inch to 8 miles, 1891.—Gorakhpur and Benares Divisions. 1 inch to 4 miles (3 sheets), 1891.—Skeleton Map of the Burma and Assam Frontier. 1 inch to 32 miles, November, 1886. With additions of boundaries and corrections to railways up to 1891.—Index to the Sheets of the Simla and Kalka Road Survey, on the scale of 6 inches to 1 mile. [Stanford, Agent.]

AFRICA.

Equatorial Africa.—Map of —, showing stations of the Missionary Societies. Scale 1:1,650,000, or 23 geographical miles to an inch. G. Philip & Son, London and Liverpool. On roller, varnished. Price £1 1s. [Presented by the Publishers.]

This map is drawn in a bold style, and is well suited to illustrate lectures on the subject of missionary effort in Equatorial Africa, as all the positions of the different missionary stations are shown. The elevations from 1500 to 3000 feet above sea-level, and those above 3000 feet, are indicated by two shades of colour. Mr. Stanley's routes 1888-90 are laid down. For the convenience of lecturers this map is also printed direct on to linen, in colours, so that it can be folded into a small space, and easily carried about.

Jeppé, Friedrich.—Die neue Grenze zwischen der Südafrikanischen Republik und den Portugiesischen Besitzungen. Nach den neuesten Quellen zusammengestellt und gezeichnet von Friedrich Jeppé. Scale 1:1,000,000, or 13·6 geographical miles to an inch. 'Petersmann's Geographische Mittheilungen.' Jahrgang, 1892. Taf. Justus Perthes, Gotha. [Presented by the Publisher.]

AMERICA.

Central America.—Rand, McNally & Co.'s Indexed Atlas of the World Map of —. Scale 1:2,450,000, or 33·3 geographical miles to an inch. Rand, McNally & Co., Chicago and New York, 1892. [Presented by the Publishers, through E. Stanford, Esq.]

United States.—Indexed County and Township Pocket Map and Shipper's Guide of North Dakota (scale 1:565,000, or 7·7 geographical miles to an inch), and Washington (scale 1:1,010,000, or 13·8 geographical miles to an inch). Rand, McNally & Co., Chicago and New York, 1892. Price 1s. 2d. each. [Presented by the Publishers, through E. Stanford, Esq.]

These maps belong to an excellent series in course of publication by Rand, McNally & Co., of Chicago and New York. By means of symbols attached to the names of places, a large amount of information is given that will be useful to tourists, or persons visiting the United States on business. With the assistance of the index, which accompanies each map, the name of the express company doing business in the district, the position of the most convenient telegraph station, the nearest mailing point, and other items of useful information, are given. The maps are clearly drawn, printed on tough, thin paper, and folded into a size convenient for the pocket. Particular care has been taken to lay down the railways correctly, and the system of surveying in sections is also shown.

CHARTS.

North Atlantic Ocean.—Pilot Chart of the —. June, 1892. With Supplement containing sixty late reports of the use of oil to prevent heavy seas from breaking on board vessels. Published at the Hydrographic Office, Bureau of Navigation, Navy Department, Washington, D.C. Richard Clover, Lieut.-Commander, U.S.N., Hydrographer. [Presented by the U.S. Hydrographer.]

ATLASES.

Johnston, W. & A. K.—Atlas of Physical Geography, illustrating in a series of original designs the Elementary Facts of Chartography, Geology, Topography, Hydrology, Meteorology, and Natural History. New, revised, and enlarged edition. W. & A. K. Johnston, Edinburgh and London, 1892. Price 12s. 6d. [Presented by the Publishers.]

The present edition of this atlas has been thoroughly revised. The plates of geology, topography, hydrology, and meteorology, have been corrected or re-drawn according to the best authorities, under the supervision of Sir Archibald Geikie, F.R.S., who has also revised, and partly re-written, the explanatory letterpress. It contains the following new maps: Geological maps of the British Isles, Europe, and America; a map of the world, on Mercator's Projection, showing the heights of the land, and the depths of the ocean basins; four meteorological maps; and a chart of the world showing the directions of the ocean currents. At the commencement of the atlas are well-chosen pictures and diagrams, illustrating chartography, and the action of rain and streams, ice and snow, of the sea, volcanic action, and the movements of the earth's crust. All of these are very well explained in the accompanying letterpress, which also contains much information with regard to all the maps that will be valuable to those who are commencing the study of physical geography. In the colouring of the orographic maps, the system followed is the same as that which is very generally employed, but which, in some respects, might be changed with advantage. For instance, in the map of Asia the country bordering on the Arctic ocean is coloured bright green, which is intended to indicate that its elevation is less than 250 feet above sea-level, but to the young student it conveys the idea of a sudden change in the features of the country, which is not the case; beside which, as green is always associated in the mind with fields and foliage, it is an improper colour to employ. There is no doubt that great skill is required to produce a number of shades, of the same colour, which shall be sufficiently distinct from one another for the orographic colouring of a map of a country in which the difference between the highest and lowest points is great, and it is sometimes necessary to use more than one colour; but where this is the case, the colours so employed should bear some affinity to one another. These remarks apply with equal force to the greater number of orographically coloured maps that are published at the present time, and they are directed at a system in general use, rather than at this atlas, which is indeed a great improvement on the previous edition, and taken as a whole, is a thoroughly useful work.

Johnston, W. & A. K.—Royal Atlas of Modern Geography. Edition in monthly parts. Part VIII., containing maps 12 and 20. W. & A. K. Johnston, Edinburgh and London, 1892. Price 4s. 6d. each part. [Presented by the Publishers.]

Sheet 12 is a map of the basin of the Mediterranean, in which the sea is coloured in five shades of blue, showing depths from 100 to 1500 fathoms. There are also inset plans of Marseilles, Genoa, Gibraltar, Valletta, Alexandria, Venice, Trieste, and a map on an enlarged scale of the Maltese Islands. As usual with the new edition of this atlas, the maps are accompanied by copious indices.

Sheet 20 contains the western half of a map of Austria-Hungary, with insets of Dalmatia, Herzegovina, and a plan of Vienna.

Signal Office, U.S. War Department:—

Normal Temperature Charts, by decades, for the United States and the Dominion of Canada.—Charts showing Maximum and Minimum Temperatures, by decades, for all years.—Charts showing the "Probability of Rainy Days," prepared from observations for eighteen years.—International Monthly Charts of Mean

Pressures and Wind Directions at 7 a.m., Washington Mean Time, for 1882 and 1883.—Charts showing Average Velocity and Direction of the Wind, prepared from observations for seventeen years.—Charts showing the Average Monthly Cloudiness in the United States.—Charts showing the Isobars, Isotherms, and Winds in the United States for each month from January, 1871, to December, 1873.

Prepared under the direction of Brigadier-General A. W. Greely, Chief Signal Officer for the army. Published by the authority of the Secretary of War, Washington City: Signal Office, 1891. [Presented by the Chief of the U.S. Weather Bureau.]

These form a valuable set of Meteorological Atlases, containing numerous maps and explanatory letterpress.

Universal Atlas, The.—Complete in 28 parts, including index. Published by Cassell & Co., Limited, London, for the Atlas Publishing Company, Limited. Part XV. Price 1s. each part. [Presented by the Publishers.]

The present issue of this atlas contains two maps on four sheets. The first is a map of the North Polar regions, with insets of Spitzbergen; east coast and south-west coasts of Greenland, and Novaya-Zembla. The second is a map of North-West Africa, which is very clearly drawn, and has been carefully brought up to date.

PHOTOGRAPHS.

Somali-Land.—Eighteen Sketches and Photographs of Northern Somali-Land, by Capt. H. G. C. Swayne, R.E. Feb. to Nov. 1891. [Presented by Capt. H. G. C. Swayne, R.E.]

These photographs and sketches, taken in Somali-land by Capt. H. G. C. Swayne, R.E., form a valuable addition to the Society's collection. They consist of well-chosen and characteristic views, groups of natives, weapons, &c. Capt. Swayne has added to the value of his donation by furnishing a sketch map which serves as an index to the localities in which the different photographs or sketches were taken.

Transandine Railway.—Twenty-nine Views from Photographs Illustrating the —. [Presented by Mateo Clark, Esq.]

This interesting series of views has been compiled from a large number of photographs taken during the construction of the Transandine Railway. The views are arranged in consecutive order, commencing from Mendoza and going towards Chile. These show that the sides of the valleys where the first portion of the work has been done are more precipitous, and present greater obstacles to the construction than further on, when approaching the summit. The scenery on both sides of the Andes is represented, and the views show the substantial nature of the bridges that have been constructed. Accompanying the illustrations is a short but interesting account of the Transandine Railway, in which details of its construction and estimates of the probable traffic are given.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

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PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*A Recent Exploration, under Captain F. G. Dundas, R.N., up the
River Tana to Mount Kenia.*

By ERNEST GEDGE, Esq.

(Read at the Evening Meeting, April 11th, 1892.)

Map, p. 584.

I HAVE compiled the following account of the recent expedition of Captain Dundas up the Tana River to Mount Kenia, from the notes and journals of the European members of the expedition. To Captain Dundas I am indebted for the notes on the physical aspect of the river; to Mr. Thompson for his graphic and carefully compiled descriptions of the natives and their customs, which time will not allow me to do more than just touch upon; and to Mr. Hobley for the geological information he has supplied, and which is of great importance.

On April 1st, 1891, an expedition under the command of Captain F. G. Dundas, R.N., arrived at Lamu, preparatory to starting up the Tana River in the I. B. E. A. Co.'s stern-wheel steamer *Kenia*, which had been constructed expressly with a view to determine the class of vessel most suitable for the navigation of that river. On April 4th the stores, &c., were transhipped to the *Kenia*, which was lying moored under the right bank some 1200 yards from the entrance.

The expedition was composed as follows:—Captain Dundas, commander; Mr. C. W. Hobley, geologist; Mr. Bird Thompson, assistant leader and interpreter; Mr. T. Hunter, of the B. I. Co., chief engineer of the s.s. *Kenia*. The crew of the *Kenia* consisted of an Arab serang with eighteen hands all told, and the caravan of two head-men, ten Askaris, and seventy-one porters.

Before starting Captain Dundas made a survey of the river entrance, and found the depth of water on the bar to be from $\frac{3}{4}$ to 1 fathom during the low water neap tides. A start was made on April 6th, a barge being towed astern from ropes on either quarter. The barge, however, had to be sent on with a crew of Wa-Pokomo, who live on the river-

banks, and who are expert canoe-men. The course of the river at this stage runs in a north-east direction parallel to the coast-line, and is thickly wooded down to the water's edge, principally with mangroves; it is from this district that most of the timber used for dhow building at Lamu is cut. After successfully rounding Munguni Island, which lies mid-stream, the small Askari station of Mto Tana, on the left bank of the river, was reached three hours from the start. This station is kept up for the purpose of providing ferry-men across the river mouth, as the main road from Lamu to Melindi and Mambasa crosses it at this point. Not far from this station, on the right bank of the river, is a lake from which salt is extracted by the Chara, Kau, and Witu men for trading purposes with the Pokomos. Between Mto Tana and Chara the river has numerous very sharp turns, which rendered the navigation exceedingly difficult owing to the length of the *Kenia*, and it was only with the assistance of hawsers that she could be got round in some places. The river swarmed with hippopotami and crocodiles, and numbers of large black-faced baboons were to be seen on the banks.

Near Chara the country became more open, finally ending in flat, swampy ground, covered with coarse grass from 6 to 7 feet in height. After safely passing up a dangerous portion of the river, full of sunken snags obstructing the channel, the *Kenia* reached the station on the morning of April 7th. Chara lies at the entrance of the Beledzoni Canal, which connects the Tana with the River Ozi; formerly duty was levied by the Sultan on all that passed down the canal. Rice cultivation to some extent is carried on at this place, and there are also coco-nut and plantain groves, with a few areca-nut trees. Small quantities of beans and sweet potatoes are also grown, as well as some pine-apples and tomatoes. The people are Pokomos, who have adopted Islamism, and the district around is admirably adapted for rice cultivation. At present it is not largely cultivated, owing to fear of the Witu people, as well as of the Kau Swahilis, who simply take what they require, and then present the owners with a hoe or two, or perhaps not so much, in mock payment.

The Beledzoni Canal varies from 4 to 7 feet in width; the banks are entirely covered with high grass, and the depth varies, according to the state of the Tana, from a few inches to several feet. The current sets strongly down from this river to the Ozi, nearing which it slackens, owing to the set of the tide up the latter river. From Captain Dundas's observations it would appear that at one time the Ozi and Tana mouths were outlets for one large river, and the area between them is a sort of alluvial delta. During an overflow of the Tana, the Ozi even now carries off a large quantity of its water, owing to the country north-west of Beledzoni being flooded. In the heavy rains the current in the Tana is so strong that it drives the tide back in the Ozi, rendering the water quite drinkable as far as Kau, the supply for which place in the dry

season has to be obtained from wells. On the 9th and 10th the river rose rapidly—10 feet in the two days—with heavy rain on the night of the 10th. On April 12th the *Kenia* once more got under weigh, the river having risen 12 feet since the 6th, with a very strong current running. The bends were numerous and difficult to get round. Several Pokomo villages were passed on the way, whilst the surrounding country was thick grass, with forest in the background, converted into a swamp by the rise in the river. Further up the river widens considerably, with longer reaches, and the country becomes more park-like. On the 14th the Free Methodist station of Golbanti was reached. Here Captain Dundas went ashore to see if a suitable spot could be found for making a dock in which to leave the barge, but the whole country being one vast swamp, this was found to be impracticable. Having taken in a supply of wood, the *Kenia* therefore continued up the river to Ngao, which was reached in the evening, after some narrow escapes from the overhanging trees of the thickly wooded river reaches.

At Ngao the river makes a sharp bend, on the point of which is a good sized Pokomo village, whilst opposite on high ground is the German mission station. Half a mile back through the woods is the Lake of Ashakababo, which was not at the time in any way connected with the river, as was supposed, and which was visited by Captain Dundas. The inhabitants cultivate rice, millet, Indian corn, beans, and potatoes, growing only so much as is required for their wants. The village is only six hours from Witu, and has always been heavily raided by the people of that place. It is also within two days of the Kau Swahilis, who call the Wa-Pokomo as far as Ndera their slaves, and take whatever they want from them. The time here was spent in choosing a site and making a dock for the barge, as well as interviewing the Wa-Pokomo and Gallas who came on board, and who were much astonished at the sight of the steamer. They gave most friendly assurances to Captain Dundas, saying they were no longer afraid with Europeans there to protect them. Life here was not rendered too pleasant by the myriads of insects which infested the place, mosquitoes included, the river keeping up its bad reputation in this respect. Till the 23rd all hands were busy at work cutting out a dock and erecting a shed over the same for the reception of the barge, where she was finally placed and snugly housed in. Ngao was left on the 23rd. The river widened considerably, with few bends and long straight reaches and an estimated width of 100 yards. Five miles above Ngao the river had overflowed its banks, forming a large swamp. Further on the land became much drier, stretching away in large grass plains with scattered mimosa trees.

Passing through a narrow thickly wooded reach, the *Kenia* entered two broad reaches, where the river widened to 200 yards, and at 6 p.m.

arrived at the village of Merifano, where the caravan was sent on shore to camp for the night. Very little cultivation is carried on at this place, the banks of the river being too high and dry for rice crops, though the country around is admirably adapted for cattle grazing. Proceeding on the 27th the *Kenia* reached Engatana, distant 11 miles from Merifano by river, and lying in lat. $2^{\circ} 13' 34''$ S. and long. $40^{\circ} 1' 25''$ E. From Merifano to Engatana, both banks of the river are well cultivated, and the crops include large quantities of sugar-cane, plantains, a little rice, millet, maize, sweet potatoes, beans, and papaws.

A very difficult bit of navigation, owing to the numerous sharp bends and flooded banks, took the expedition past Kulesa, where the remains of a Swedish mission station were seen, it having been destroyed by the Witu people in the late disturbances. The *Kenia* reached Mitole, on the left bank of the river, on the evening of the 28th of April. This is another great rice and plantain district, nearly all the plantations lying on the right bank. From Mitole the *Kenia* proceeded to Mwina against a strong current and in heavy rain, being just able to hold her own against the stream, whilst the trees and sharp bends threatened damage every moment. The river had risen another 3 feet, and the banks and surrounding country were flooded. Extensive cultivations border the river on both banks from Mitole, and Mwina itself is a large plantain-growing district.

Here end what are called the southern Tana Pokomo, and this is the last place over which the Swahilis claim authority; the people of Ndera, higher up stream, are of a very different and less servile stamp, and well able to hold their own. Until quite recently the Gallas treated the southern Tana Pokomo in the same manner as the Swahilis, with the exception of enforcing their wishes with a spear instead of a gun. Men and women were seized indiscriminately as slaves, and labour enforced by both Swahilis and Gallas, without any attempt at reprisals on the part of the Wa-Pokomo, who are naturally affectionate in their private relations, so that this treatment must have been doubly hard on them. The Pokomo marries only one wife, and has no concubines, and he cannot marry again until his wife dies. They are a kindly, truthful, and honest people if unmolested, but just the opposite when under fear of pain or death. Their villages line the river-banks; the huts are of beehive shape, on raised floors, to keep the interiors dry in times of flood. The people themselves are of a light-brown colour, and closely allied to the Wanyika. They wear beads and brass wire ornaments, as well as a small cloth round the loins. Each district is governed by a chief, assisted by a council of elders. They are expert canoe-men, and spend much of their time hunting the hippos and crocodiles, which are killed with spears having shafts from 8 to 10 feet in length.

Leaving Mwina on April 30th the *Kenia* met with a serious mishap, and proceeding slowly with one engine she reached Kosi, in Ndera, safely

on May 1st, in long. $40^{\circ} 1' 57''$ E., lat. $1^{\circ} 57' 5''$ S. This is one of the largest Pokomo villages on the Tana. The people are darker coloured than those further south, probably from admixture with other tribes, and in addition are armed with bows and arrows. The country around this district is better wooded than lower down, and is a great canoe-building centre. All kinds of produce are cultivated, and in the woods are found coffee and indiarubber, though the former is unknown to the natives; some ivory is also to be had. The villages between Ndera and Guano are built in impenetrable jungle, the paths leading to them ending at the river: like most African tribes, the people are very chary of admitting strangers. This extreme caution can be understood, as the Somalis are constantly raiding on them for slaves. Unable to attack the villages on account of their strong positions in the forests, the Somalis lie in wait and capture any solitary individuals they may find working in the fields. Should the captive make any resistance he is put to death. As a consequence, the Somalis are much feared, and at Guano a bottle buried up to the neck in the ground, with a little shed built over it, was pointed out as a medicine specially warranted to keep them off. The chief at first received Captain Dundas very sullenly, but soon thawed when he found that the Europeans had not come to attack him, as he had imagined, and remained throughout on very friendly terms.

The breakdown to the *Kenia* necessitated Captain Dundas sending the broken part of the machinery to Mombasa to get it repaired, and whilst awaiting its arrival he took several trips into the surrounding country, which he found mostly overgrown with impenetrable thicket. Heavy rain fell; the river again rose, overflowing its banks and submerging the surrounding country. On May 20th the water was 3 feet deep in the village of Kosi and the river still rising. Large islands of vegetation, and trees were being swept down by the fierce current, fortunately without damage to the steamer, which was moored under a small projecting point. On June 4th, the *Kenia* proceeded on her voyage. The scenery up the river from Ndera to Guano was very fine. Beautifully foliaged trees covered with creepers fringed both banks of the river, interspersed with villages and plantations, whilst the country inland was all under water. Passing through extensive cultivations, the *Kenia* reached Guano the same morning. The great honey district of the Tana commences here. Though the Pokomos do not eat it, they make an intoxicating beverage from it, and a whole village may occasionally be seen drunk, especially when the people have driven a good bargain in ivory trading. At this place there is a famous tusk of ivory which has been in the chief's possession a long time, which he has hitherto been unable to sell on account of the enormous price asked for it. Captain Dundas was taken, with much ceremony and mysterious proceedings, to see this famous tusk, but on his hinting at a purchase,

the chief changed the subject, and the meeting dispersed. Like all Africans, these people will haggle over a bargain for days.

From Guano to Kinakombé, the river widened out, with long straight reaches, and deeper water than had yet been experienced. The left bank of the river was densely wooded for some miles after leaving Guano, the country further on becoming more open, though still preserving its flat aspect as in the lower reaches of the river. Between Guano and Kinakombé enormous quantities of plantains are cultivated, also sugar-cane, manioc, sweet potatoes, two kinds of beans, pumpkins, water-melons, rice, tobacco, and Indian corn. The Pokomos take snuff in great quantities, but do not smoke. Before reaching Kinakombé the Galla village of Rasira was passed, lying on the right bank of the river. The country at the back of Kinakombé is mostly open grass land suitable for cattle-grazing, but neither Pokomos nor Gallas dare keep them on account of the Somali and Masai raiders. Near the river much cactus and mimosa scrub is met with. The village itself was flooded the same as those lower down.

Near Kinakombé Captain Dundas encountered some Waboni, a nomadic tribe getting their living by hunting, and acknowledging the Gallas as their masters. They are a dark-coloured, wiry-looking race, by no means bad-looking, with but little of the negro about them, and presumably of Galla origin, speaking the same language and maintaining many of the Galla characteristics. They reside in roughly made beehive-shaped grass huts, and follow the game as it moves to and fro from the different pastures. Bows and poisoned arrows are used in their hunting expeditions, and in this respect they resemble the Wandorobo, with the exception of not using the spear in hunting like the latter. The poison used is probably the same as that used by other tribes, made from the roots of the murju tree; it is very deadly when fresh. The etiquette of hunting is strictly observed: thus, if a dead elephant is found by a hunter any other than the one who wounded it in the first instance, the owner is identified by the private marks found on the arrow-heads when cut out, and the game is handed over to him; one tusk being immediately taken as tribute to the nearest Galla chief, while the hunter is at liberty to sell the other. The Waboni are the great elephant-hunters of the upper Tana, almost all the ivory being obtained originally from them.

Leaving Kinakombé on June 5th, the *Kenia* passed up some long wide reaches bordered by extensive rice-fields. Avoiding several dangerous snags in the river, she was hauled up under a high bank at noon, where camp was pitched. Here the "Barra" or steppe which lies at the back of the Tana valley all along, comes down to the river, and is covered by mimosa scrub, cactus, and grass. Whilst wood was being cut for fuel, Captain Dundas made a short hunting excursion inland, but saw very little game of any kind, though judging from

the tracks there must have been buffalo, waterbuck, zebra, hartebeest, and other antelope somewhere about.

Rain poured in torrents on the 9th, and the whole country was flooded, the *Kenia* in one spot passing over a rice-field, thus saving three-quarters of a mile by cutting off a corner. Marumbini, in Subakini, is the largest rice-producing district on the Tana, where the Sultan of the district resides. Here was some delay owing to an accident to the steamer. Tuesday, June 16th, saw the *Kenia* once more on her way up stream. The river preserved the same aspect of long wooded reaches, with the addition of numerous islands, but it was impossible to say whether these were caused by the floods or not. Numerous sandbanks obstructed the channel.

Close to Mitumbini village two streams were noticed running into the Tana, the first tributaries that had been seen on the journey. The navigation of the river was now rendered extremely difficult from the numerous sunken snags, sandbanks, and overhanging forest trees, and several times the *Kenia* had narrow escapes. Boru was reached in the evening of the 17th, the villages of Ripa and Masa (or Chevele) being passed *en route*. All along the river from leaving Ndera, the natives had hidden themselves on seeing the vessel, as Captain Dundas had been told they would by a Swahili trader. On the 19th they arrived at Kidori. This is the last village on the Tana in which the true Pokomo are found, and right away from Kinakombé to this place rice is abundantly cultivated all round the villages. Kidori was found to be uninhabited and overgrown with grass, the people having left it and gone to their plantations during the flood time. Above Kidori, the river altered to a deep chocolate colour, flowing through dense forests.

For the next two days and a half the *Kenia* passed through the Manyole district, inhabited by the Wasania, a tribe akin to the Wabou. Here and there were to be seen small groups of huts, which had been deserted by the people on seeing the steamer. The river was now falling rapidly, and Captain Dundas was exceedingly anxious to get up to Koro Koro before the water failed him. The snags increased in number, 40 being counted in one reach, as well as some 20 or 30 large trees which had fallen across the river from either bank, their branches nearly meeting in mid-stream. Some excursions into the surrounding country revealed the existence of large herds of elephants, from the numerous tracks in all directions, though none of the animals were to be seen. On the 24th there was only one fathom of water in the river, which was falling daily. Occasional glimpses were afforded of distant ranges of hills in the intervals between the thick forest lining the shores. The next day a difficult passage was effected round an island where a tributary stream joined a shallow part of the river, there being only just room for the vessel to pass; the same day the village of Oda Doki was reached. Seeing some people standing and lying about, Mr.

Thompson was sent to tell them not to be alarmed. On his return he reported them as being all helplessly drunk, this accounting for their remaining behind when the others bolted.

Just above Oda Doki, the village of the Galla sultan Sadi Ramatha was passed; the former sultan having been shot by Dr. Peters, and this man installed in his place. He was reported as being very friendly to the English, which was verified by his handing some goods over to Captain Dundas which had been left in his charge. Near Oda-bororivu, in the Koro Koro district, the water fell to three-quarters of a fathom, with numerous snags and sandbanks. The scenery was very beautiful, the trees being finer than any noticed previously. Arriving opposite the place where the village was said to be, Captain Dundas sent a head-man on shore who had been there with Dr. Peters. All traces of Dr. Peters's house and the village had entirely disappeared, nothing but high grass to be seen, the village and station having been burnt by the Wakamba, so far as could be learnt; though it seems much more probable that it was done by the Wa-Gallas in revenge for their people being killed by Dr. Peters. Captain Dundas succeeded in obtaining two guides from one of the villages to go with Mr. Thompson overland as far as Hameyé, he himself intending to try and get up there in the *Kenia*. In spite of the shallowness of the river and the obstructed state of the channel, he succeeded in reaching this place on June 27th. Between Koro Koro and Hameyé the river is dotted with numerous islands, on which the inhabitants grow their small crops of plantains and maize. Lower down at Koro Koro no rice is grown, but a fair quantity of maize, plantains, and beans, besides sugar-cane, is cultivated. Hameyé itself consists of a few small huts, though there is a larger village a few miles inland also called by the same name.

From Koro Koro to Hameyé no cultivation is carried on on the right bank, owing to the raids made on the people, who call themselves Wa-Koro Koro, by the Wakamba, and partly on account of the dense jungle. Had Captain Dundas been delayed another day he would not have succeeded in reaching this place, as the water on the day following his arrival had shoaled to 2 feet. Here was seen for the first time anything like a rocky formation on the river, the soil having up till now been rich alluvial near the river, assuming a sandy character on the Barra further back. The rocks at this spot consisted of gneiss, and lower down fine gravel was to be seen near Koro Koro. Though the soil bordering the upper reaches of the river is so productive, the natives do not cultivate it largely, on account of the difficulties of communication with the coast, as the Pokomo do not carry loads, all transport being done by canoes, which go down stream easily enough. The return journey against the strong current is a different matter, another preventive being the fear of being seized and sold as slaves on the coast, or captured by Somalis *en route*.

The people at Hameyé were delighted to see Captain Dundas and his party, and on being informed that a station with a resident European would probably be established in their district, they replied that when it was built they would then come and settle without fear in the vicinity, as the Wakamba and Somalis could then no longer raid them. They also said there were large quantities of ivory in the district, for which they would gladly do trade. This being the spot from which Captain Dundas had decided to continue his journey to Mount Kenia overland, he set to work to build a station with a strong stockade round, in which to store his surplus goods and to house the guard left in charge of the steamer. The natives gradually got accustomed to the sight of the steamer, and came in bringing food, &c. Captain Dundas also received a visit from Boneya the Galla sultan's brother, who was a handsome old man, but who had been evidently sent by the sultan to find out what his intentions really were, all faith in Europeans having been lost since Dr. Peters's visit. This old man gave the following curious account of the origin of the Wasania. The Gallas, who say they were first created, a short time after their creation met strangers like themselves in appearance and speaking the same language. These strangers had oxen with them and told the Gallas that these had been given them by God, who had placed them and the oxen on the earth and ordered them to hunt elephants. The Gallas replied, that if they wished to live in peace they must hand over the oxen, besides one tusk out of every pair taken in their hunting. This being agreed to, they have always lived in peace and adhered to their bargain faithfully.

On the 12th July, while on his way to meet some of his people for trading purposes, Captain Dundas encountered a large raiding force of Wakamba some thousands strong. The Gallas did not put in an appearance, so Captain Dundas went and interviewed the Wakamba, who wanted to fight somebody, but who were not in any way particular as to whether it were the Gallas or Somalis. They did not like the idea of going to see Captain Dundas at the steamer, and shortly afterwards they all retired without offering to molest the Europeans, who saw them no more. The chief Galla settlement is at Gallana-benabe, an island down the river where the people live for safety from the Wakamba and Somalis. The huts are beehive-shaped like those of the Wa-Pokomo, but have not the raised floors. Being herdsmen, they employ slaves to do what cultivation is required for their wants. Formerly they possessed large flocks and herds, now they have only a few. By nature they are a gloomy, melancholy race, always brooding over their past greatness, which they say was lost through their own fault. In appearance they are a tall, slightly built, handsome race, with good features, and coarse curly hair, though it is not woolly like the negro. Each man carries two spears, one large for stabbing, and one

small for throwing, besides a large knife. Here it will not be out of place to give their own version, handed down by tradition, of the manner in which their greatness departed from them. When God first created them He gave them a book in which His orders were written, telling them that so long as the book and its laws were kept by them, they would be the greatest nation on earth. For a long time they prospered and waxed mighty, until at last they got careless and left the book lying about. One day, an ox in passing swallowed the book, and from that day their power declined. Hence a custom which is now observed of opening and examining the entrails of any ox that dies or is killed for food in the hopes of recovering the lost book, for if they could once more regain possession of it they believe they would again become the most powerful nation on earth. They were undoubtedly a very powerful race at one time. All the Tana district to Munkeni on the coast and Makangoni on the Sabaki river was theirs. The Swahilis dared not trade with the Pokomos, and the latter were forbidden to trade with the Swahilis. This led the Swahilis to combine with the Somalis, who came down in force some eight or nine years ago, carrying all before them, finally capturing and burning the Galla stronghold of Kitumbini, near Kau, and carrying off all the cattle, since which time the Galla power has been broken. Their marriage customs are a matter of purchase, as in other tribes, the girl not being consulted in any way. If the first child born is a female it is taken away and left to die in the woods. Each district is governed by an elected chief, but when once elected the office becomes hereditary. As ornaments they wear necklaces and bangles made of brass and tin, and very small tin earrings; also one large brass or iron ring, with sharpened edges, used for striking with when fighting at close quarters. Flesh and milk is their chief diet, and they also drink an intoxicating liquor made from honey, and they are in addition great tobacco-chewers.

Various short excursions in the surrounding district were made during the stay of the expedition at this place, in which Captain Dundas and his companions had better fortune in their hunting, securing several waterbuck and other antelopes, besides seeing giraffe and other game. Here too they were attacked by bees and many men very severely stung. The bees were finally dislodged by destroying the hives around the camp at night. At length the station was finished and all ready for a start. On August 17th the expedition of three Europeans, ten Askaris, together with seventy-three porters, left camp for Mount Kenia. Taking a route parallel to the river over an undulating barren wilderness, intersected by numerous dry watercourses, with outcrops of pink gneiss, angular fragments of which were scattered over the country, rendering travelling anything but pleasant as there was no road, the expedition arrived on the 19th at a point on the river some distance below the first falls, and the following day Captain Dundas set off in a canoe to

determine their position. Approaching them the canoe had to be abandoned, owing to the rapids, and the river followed on foot. The falls, which are called Hargazo by the natives, are the Hoffmann Falls of Dr. Peters, and are more in the form of a cataract, rising in three tiers to a height of 20 feet, the tiers being composed of ledges of gneiss, and above them again are other smaller falls of from 7 to 8 feet in height.

On the 20th the caravan camped some 500 yards above the falls, the canoe being brought overland after being unloaded of the grain she was carrying in her. The next day Captain Dundas and Mr. Thompson crossed the river to try and get into communication with the Wakamba who come to hunt at this spot, but only found one unfortunate man who had been lost for seven days in the Barra and who was nearly dead with hunger and thirst. He was brought into camp and speedily revived on food and water being given him. On the 22nd, with the rescued Wakamba to act as guide, a short march was made over the same arid, barren-looking country, which became more mountainous as the expedition advanced. Opposite the camp, on the far side of the river and some four miles back, were two peculiar dome-shaped hills of red gneiss.

At midday on the 24th, Captain Dundas, having recovered from an attack of fever, proceeded. The road at first was fairly level, afterwards entering a region of bold outcrops of gneiss with hornblende schists, the river rushing in a series of falls through a rocky gorge. On the 25th the canoe was finally abandoned as it was impossible to take it any further. A high range of mountains was observed lying to the west, but nothing having the appearance of Mount Kenia. Though still weak and suffering from fever, Captain Dundas, keeping near the river, continued his journey over the same rocky forbidding country, which was varied by flat stretches in places. The river at times ran through deep gorges, and at others wound sluggishly along in broad still reaches. The expedition arrived at the Mackenzie river, Mr. Pigott's furthest point, on August 28th. Just above where this river joins the Tana from the north, the water comes down over a fine fall, having carved a gorge through the nearly vertical fold of hard hornblende schists at this spot, the fall itself being some 50 feet in height. Some difficulty was experienced in finding a ford by which to cross above the falls. Leaving this river, the caravan bore away southward, and regained the banks of the Tana, which at this point is one mass of small falls and rapids. Up to this time no natives had been met with, though a few hunting Wakamba, who ran away on the approach of the caravan, had been seen on the opposite bank of the river. After crossing a strip of very fertile plain another small tributary running into the Tana from the north was forded. On the main stream a succession of rocky ledges were surmounted, the river here flowing through steep banks of meta-

morphic rocks, with a deep channel about 120 feet wide, and occasional rapids. This rocky stretch extended some four miles. Some Wakamba out hunting were met with on this march, and large numbers of dead buffaloes were seen, having died from the cattle disease. On the 30th another small tributary was crossed, and the expedition arrived at a spot where the river makes a fork, forming a large island. From this point it was impossible to continue along the banks owing to the roughness of the ground, so a *détour* was made which brought the caravan above the rapids, where shortly afterwards the main Swahili trade route to Mombasa was crossed.

Seeing no hope of meeting with people on the left bank, and as food was running short and the caravan getting into difficulties, Captain Dundas crossed the river and continued along a slight track which had apparently been made by natives. This was the first bit of anything like a road that was seen, as hitherto all their marching had been across country under great difficulties, the caravan having in many places to cut its way through the dense bush. Emerging from these sterile wastes on September 2nd into a beautiful, fertile highland district, the expedition found itself in the Wathaka country, a land of numerous villages, fine pastures, cattle, and well-tended plantations. The scenery here was very fine, mountains on all sides, with a high range extending as far as one could see up the river, with woods on either side of the valley. The chief was well disposed, receiving the expedition in a friendly manner, besides going through the form of blood-brotherhood, which was done by a small incision being made in the arm of each, a piece of slightly cooked goat's liver being rubbed in the blood and swallowed by the respective parties. A treaty was also concluded with him on behalf of the company by Captain Dundas.

The principal objects of cultivation in this district are millet and a small black grain, while in lesser quantities are grown maize, castor-oil plants, used by the natives for anointing their bodies with, and tobacco, the Wathaka being great smokers and snuff-takers. The people are active and of middle height, dark brown in colour, but with little of the negro about their appearance. Those who wear anything at all are clothed with a small skin round the loins. For ornaments they wear brass and iron bangles, bead necklaces, bead and wooden earrings, of such a size that the ear-lobe is enormously stretched by them, sometimes depending to the shoulder. Their arms are bows, arrows, spears of different patterns, clubs, and the *simé* or spatulate-shaped sword; and in certain other respects they resemble the Masai. The office of chief is hereditary, though should the reigning chief die without male heirs, another is elected by public vote. They marry two or three wives according to their means, though they have no concubines. A man's property, including his wives and children, go to his eldest brother at his death. The villages are built on the slopes of the hills, the huts

being circular, made of wood, and neatly thatched with fine grass. Food was, however, very dear, and though the natives had ivory to sell it could not be bought, the expedition having no goods for the purpose. The heat all this time was very great. On September 5th the caravan camped in lat. $0^{\circ} 15' 23''$ S. The river here bends away to the South, and the country all around exhibits large outcrops of gneiss. On the 12th the expedition left the Wathaka country and entered upon a sterile hilly region, covered with thorn-bushes and scrub, and on this day Mount Kenia was seen for the first time, recognised by the snow-clad peak which appeared high in mid-air. It was only a glimpse, as the clouds soon rolled up, enshrouding it from view. Food too was now running short, as owing to the heavy price asked by the Wathaka a great amount had not been purchased. Fortunately a small species of wild bean was discovered growing in one place, which turned out to be good eating, so the men were set to work to gather a quantity. Sickness was now making its appearance amongst the porters in the shape of dysentery, and all were feeling exhausted from the rough marching; it was, therefore, with a feeling of great relief that they arrived at the confines of the Mbé country on September 17th. After several futile attempts to bridge the river, owing to its width and the rapidity of the current, it was finally crossed on a raft constructed for the purpose.

From the Wathaka country up to this point the Tana had been a succession of rapids, the bed of the stream filled with large boulders of gneiss, whilst in many places the river foamed through deep gorges formed by the cutting action of the water through the rocks. Mount Kenia was observed bearing north-west from this place.

The people of Mbé are a fine race, of apparently Wakamba origin, who have to some extent developed different characteristics to the true Wakamba, from living in contiguity to the Wakikuyu and Wathaka, and from not being brought in contact with their own people. They go almost entirely naked, with the exception of the elders, who wear skins. Their weapons are similar to those of the Wathaka, made by themselves from iron found in their own country, and, like them, the office of chief is hereditary; but should the chief die without a son or brother to succeed him, his head wife is married by an elder who happens to be a bachelor, and this man then becomes chief. They have many wives as well as concubines, and, like the Masai, leave their dead unburied. They worship a god called Matu, who, they say, lives in the clouds. Though they possess cattle, sheep, and goats in some numbers, the country is almost entirely given over to cultivation, it being more adapted for this than for cattle-grazing.

The people were friendly and food was cheap and abundant in this district, tobacco being plentifully grown amongst other things. The villages are built openly in the plantations in clusters of from twenty to

thirty huts of circular form, the sides being made of rough sticks, and not so neat in appearance as those of the Wathaka. The grain when cut is stored in houses having raised floors, after being threshed out on a place where the earth has been pounded till it resembles a cement floor. These threshing floors are circular in form, surrounded with an outer ledge, made of clay, some eighteen inches high. The women are very clever at making bags in which they carry the grain, from the fibre of the bark of a certain tree, from which good rope is also manufactured. The scenery here was very grand. To the south, following the course of the Tana, was the great mountain range of Mumoni with the darkly wooded river flowing along its base. The massive Kenia could be faintly seen rising in the north-west, whilst the rolling fertile country of Mbé filled up the foreground, with numerous beautifully clear streams coursing down the valleys between the slopes. On the 21st a fine solitary mountain was also seen on the right of the route, being in all probability the Albert Mountain described by Krapf.

On the 24th the route lay through a beautiful park-like country among the hills intersected with numerous small icy-cold streams. In the evening camp was pitched by a small river flowing direct from Mount Kenia. The stream marks the boundary between the Mbé country and Kikuyu. The geological aspect of the country had changed from gneiss rocks to a series of hornblende and mica schists, becoming harder and more indurated as the caravan proceeded west. In the dry watercourses the boulders were quite smooth as if polished.

Crossing the stream and entering the Kikuyu country, the caravan found itself in a densely populated district; the villages lying on the slopes of the hills, which were a mass of luxuriant crops, beautiful trees, and sparkling streams running south to join the Tana river. The plantations appeared like market-gardens, so well were they kept. The common bracken, clover, both red and white varieties, together with many other common English wild flowers, flourished amid the green turf which carpeted the ground in places. The character of the Wakikuyu has already been described by Mr. Joseph Thomson and other travellers, so there is no need for my repeating the description. Their thievish, treacherous disposition showed itself to Captain Dundas in the way that all have experienced who have ever visited their country. The temperature fell very much now that the elevation was increasing, the nights being very cold, whilst fuel was difficult to procure, the forests lying some distance away from the extensive clearances. On the 25th the Wakikuyu came into camp, reporting that the Masai were in force, raiding their country. This proved to be the case, for on topping the summit of a ridge the expedition saw the Masai marching in single file, some 500 strong, half a mile distant, whilst the smoke from the

burning villages ascended from the surrounding country. There is no knowing what would have been the result had they chosen to attack the expedition, as the porters were a cowardly lot, who would not have been likely to stand when it came to fighting at close quarters. On seeing the expedition the warriors halted, and Captain Dundas at this juncture drew up his men in such a way as to give the Masai the idea of his having a much stronger force than he really possessed. It was probably owing to this display that the Masai fortunately continued their march, and though all preparations for resisting an attack were made in camp that night, the expedition was not molested by them.

On the 28th, leaving 50 men in camp at Kikuyu, Captain Dundas and his companions endeavoured to ascend Mount Kenia, having now arrived at its base. The first day took them through dense forest overgrown with mosses, dark and gloomy, with no sign of life in its dense shades. The cold was severe and the heavy mist and dew rendered everything damp and chilly. The following day the region of bamboos was entered, the caravan taking advantage of the elephant tracks through the canes, otherwise it would have been impossible to proceed. Emerging from this forest on the 29th, they found the ridge they were ascending ran nearly due west, with four distinct ridges visible between their standpoint and the peaks, which were some 6 miles distant, each covered with dense jungle. Between them were deep ravines, too steep for men with loads to pass, and if the ridge on which they stood were followed to the summit it would take at least three days more to reach it; the ridges all sweeping round in spiral fashion from west to east. The highest point reached was about 8700 feet, where specimens of volcanic ash were obtained, and dog-violets, thistles, docks, forget-me-nots, and clover were found growing. The mountain itself is, according to Mr. Hobley, more properly a mountain chain, and not a single mountain, the chain or range stretching from west to east, commencing in the high Leikipia Plateau and rising steadily until it culminates in the great double peak. Then comes the second large peak, with five or six other smaller ones; after these again some lower mountains, all more or less connected, and finally an isolated hill is seen rising in the Barra to the east. No mention is made of the tree *Senecio Johnstoni*, which hitherto has only been found growing on Kilima-njaro and Mount Elgon at over 10,000 feet, though it is no doubt found on this mountain as well. The ascent could in all probability be accomplished without great difficulty from its north-east side, as the drainage, which in a great measure forms the deep ravines, appears, as at Kilima-njaro to be on the southern aspect; the spot at which Count Teleki made his attempt to the north of the mountain seems to have presented no unsurmountable obstacles to the undertaking. The furthest point reached was shown by dead reckoning to be in lat. $0^{\circ} 6' 46''$ S. With regard to the geological structure of the mountain, not much information could be gleaned, only

two exposures, one of volcanic ash and the other of basalt, being noticed; but the general appearance of the mountain would suggest a comparatively recent volcanic formation. Retracing its steps, the expedition, on October 1st, found itself once more back in the Kikuyu country; the people received them in a more friendly and less suspicious manner than previously.

The Wakikuyu brought a man into camp who, they said, belonged to the Warnguru tribe, who inhabit caves on the north side of the mountain. He was an enormously muscular man, 6 feet high, with bushy black beard, whiskers, and moustache, and chest, back, and arms covered with hair. He spoke a language that few could understand, and treated the Wakikuyu with great contempt. He had come with five others to Kikuyu "for a walk," as he said. He was clothed in skins and carried a broad bladed spear. During the return march to Mbé the devastation caused by the Masai was seen, in the shape of decomposing corpses and burnt villages, with groups of disconsolate people sitting and standing about, who gave detailed accounts of the horrors of the raid; their men, women, and children had been slaughtered indiscriminately. The children, being collected, were shut up in huts, which were afterwards burnt over them; the cattle had been seized and the people's homes broken up and ruined. It was a sad picture, and one which brought home forcibly the necessity of sharp stern measures being taken as speedily as possible with these marauders, who are a curse to the country.

On October 5th the expedition arrived on the spot on the Tana where the crossing by raft had been made. From this point the journey was continued along the left bank. This was found to be much better travelling, the country being fairly open, with alternate stretches of table-land and broken hilly ground.

On the 13th, a river, supposed to be the Kiloluma, which flows into the Tana from the north, was reached, being nearly as wide in appearance as the latter, with a great volume of water falling over a ledge some 7 feet in height. This river, which was waist deep, with a strong current, was forded, and the valley inhabited by the Wathaka was reached on the 14th. On this side of the river the country is not so fertile as that passed through on the opposite bank during the upward journey, nor so well cultivated, the people all living on the hills for fear of the Masai, as they have large herds of cattle.

On October 17th, another large tributary of the Tana from the north was crossed, it also having a rapid current which was forded with difficulty. The channel was full of rocks, with falls at the junction of the two rivers, at which spot were also the highest falls on the Tana that had been noticed, having a clear drop of some 60 feet. These "Grand Falls" are situated in lat. $0^{\circ} 18' S.$, and could not have been seen by Dr. Peters as he does not mention the

junction of the rivers at this point. Harassed by the Wathaka, who continued to shoot arrows at the caravan whenever an opportunity offered, the main Swahili trade route was reached safely on October 19th. A halt was made on the 22nd, Captain Dundas again being down with fever, from which he seems to have suffered a great deal, until at length the station of Balarti, below Haméyé, was reached on October 30th, the caravan having followed its upward route back from the spot where it joined the great Swahili road. Everything was found in good order at the station, and the steamer intact. The Europeans' house was finished and had been fitted with doors and windows by the carpenter, and the men were in good health.

I shall now give a short summary, compiled from the general notes made on the expedition, of the physical features of the River Tana. In appearance it may be likened to a miniature Nile for the whole of its navigable length, a distance of some 300 miles by river, flowing through a vast plain, and generally confined between low banks, which are overflowed and the surrounding districts flooded during the rise of the river in the rainy season. In fact, the whole country from Charra across to the Ozi River may be described as one vast swamp choked with rank vegetation at this season. Only a small fraction of this area is cultivated at present; it is large enough to grow all the rice the Company might want. A great drawback to the river is the shallow bar at the entrance, forming a serious obstruction to its navigation. Like all rivers flowing through alluvial deposits, the Tana has numerous sharp bends, with a constantly shifting channel, caused by the water undermining the concave side of the banks, and throwing the sand up on to the convex points opposite, thus rendering it impossible to mark out any regular channels. In flood time the fierce current takes these sandy deposits up, throwing them about the channel in the form of sand-banks, on which all *débris* and drifting trees collect, forming the snags which are so dangerous to vessels. Stretching far back on either side of the river, behind the broad alluvial deposit, rises the barra or steppe, which runs parallel to its course till it joins the river at its upper reaches among the hills. Above Haméyé, the river is a succession of rapids and falls, the channel choked with boulders and quite unnavigable. In fact, it has the general appearance of a mountain torrent of large dimensions.

As I have already described the inhabitants, with the villages and cultivations situated on the river banks, there is no occasion to refer to these again. With regard to the geological structure on the upper reaches: this appears to consist principally of gneissic formations above Haméyé, which on nearing Mount Kenia gradually change to indurated hornblende schists, till on the mountain itself it again changes to basaltic rocks and volcanic ash. To the east of the Wathaka country the dykes or bands of gneiss were exceedingly porphyritic, with a super-

abundance of orthoclase felspar, this not being the case to the west of those countries. In the Mbé district, to the south-east of the Albert Mountain, feldstones are met with. Garnets are found with comparative frequency among the schists, but are of rare occurrence in the Mbé district. Noting these facts, Mr. Hobley thought it possible that the rocks might be divided into two series, but was unable to obtain any evidence of a sharp line of juncture. If there should be one, it will probably be found west of the Wathaka country, near the boundary.

From Hamoyé Messrs. Thompson and Hobley were despatched with the caravan to the coast *via* Ukamba, which country was reached after a nine days' march through the bush. They passed through the hilly district inhabited by the Wandorobo on the way. These people have much ivory in their possession, which could be easily got at from a station at Koro Koro or Galanabe, on the Tana, it being only a six days' march from the latter place.

As Mr. Piggott has already described the countries between the Tana and Ukamba in the report of his expedition in 1889, there is no occasion to allude further to them, as this paper is intended to deal exclusively with the Tana river.

Captain Dundas, starting on November 20th in spite of the low state of the river, managed, after much difficulty, and with many narrow escapes, to reach the coast in the *Kenia*, on December 23rd, having throughout conducted the expedition in a manner reflecting great credit on all concerned in it; whilst the information brought down, together with the observations taken on the journey, should be of the greatest value for the further development of these most interesting countries.

The following discussion followed the reading of Mr. Gedge's paper:—

Mr. E. G. RAVENSTEIN said that it was certainly one of the curiosities of the history of African exploration that rivers of the importance of the Luſſi and Tana should have remained practically unknown until quite recently. Krapf, indeed, had identified the Tana with the Quilimanci, or Chimanchi, of early writers; but if we read what De Barros or Pigafetta said about this river, we should find that it could not refer to the Tana, but pointed rather to the Jub, or perhaps to the Haines River, at the back of Magdeshu.

Older cartographers indicated one or two rivulets as entering Fernos Bay, but it was only as a result of Captain Owen's surveys that an unnamed river, which was undoubtedly the Tana, found a definite place upon our maps. Captain Botcher, one of the officers serving under Captain Owen, anchored off the Ozi mouth in 1824, and was told that this river was navigable for fifteen days upwards, as far as a district Subaki, in the Pokomo country. Subaki was actually a district on the Tana, which was thus supposed to be the upper course of the Ozi. The first explorer to distinguish between the two rivers was Dr. Krapf, who, starting from Rabai, near Mombasa, reached the upper course of the Tana on August 27th, 1851.

The actual relations between the Ozi and Tana were first brought to light by Baron von der Decken, who ascended the former of these rivers to Kan in 1865,

and thence passed through the Beledzeni Canal into the Tana. Further discoveries were made in 1866 and 1867 by the Messrs. Wakefield and New, who ascended the Tana to Ngao, and navigated the Ashakababo Lake, which at that time communicated with the river by a narrow channel, but which subsequently, in 1873, in consequence of exceptionally heavy rains, invaded the Tana. We now learnt from Mr. Gedge's paper that at the present time it had no connection with that river whatever. Mr. Brenner claimed to have ascended the Tana as far as Malakote, but Dr. Fischer had exposed the apocryphal character of this pretended journey, and an examination of Mr. Brenner's accounts quite satisfied him (Mr. Ravenstein) that Dr. Fischer was perfectly justified in what he said with respect to this African Munchausen.

The first scientific expedition up the Tana was carried out by the brothers Denhardt in 1878. Dr. Fischer travelled in their company. They ascended the river as far as Masa, or rather Ripa—lat. $1^{\circ} 12' S.$ —and published an excellent map of it, based upon numerous astronomical observations. A comparison of their map with that now submitted to us by Mr. Hobley showed substantial agreement. All the latitudes were identical, whilst Denhardt's longitude of Ripa only differed to the extent of 6' from that resulting from Mr. Hobley's observations. Missionaries of various nationality—English, French, German, and Swedish—as also traders, had since ascended the river for short distances; but the first expedition fitted out after that of the brothers Denhardt, which was intended to enlarge our knowledge of the country, was that conducted by Mr. Pigott, an official of the Imperial British East Africa Company, who in April, 1889, had ascended the river for 25 miles above the Hargazo Falls, where the inhospitable nature of the country and want of provisions compelled him to return when within 60 miles of Mount Kenia.* Dr. Peters, whose alleged object it was to bring relief to Emin Pasha, followed closely in Mr. Pigott's footsteps, and succeeded in forcing a passage through the difficult country traversed by the Tana, thus connecting Pigott's furthest with the route followed in 1887 by Count Teleki and Lieutenant von Hühnel. Unfortunately, neither Dr. Peters nor his companion, Mr. Tiedemann, had furnished sufficiently accurate information for cartographical purposes. Nor was this to have been expected from a gentleman who, writing at Von der Heydt House, dated his letters "at the foot of Mount Kenia," and supposed that he saw the sun set behind that giant mountain, from which, at that time, he was separated by a distance of nearly a hundred geographical miles, and which was quite invisible. Neither Mr. Pigott nor Mr. Hobley saw the Galla and Friedrich Franz mountains, which figure so prominently upon Dr. Peters's map. The Kaiser Wilhelm II. Mountain, with the Hohenzollern Peak, of which Dr. Peters presents us with a most formidable-looking picture, turn out to be "low hills, surmounted by gneiss tors." As to the expedition commanded by Captain Dundas, he should have to make a few remarks presently. He would merely add that the head waters of the Tana had been reached by Mr. Thomson, Dr. Fischer, Count Teleki, Mr. Jackson, and Mr. Gedge.

Important as the River Tana might be as presenting a navigable highway into the interior, popular imagination was far more influenced by the existence of snow-clad mountains in tropical Africa, and the discovery of snow on Kilimanjaro, in 1849, by Reimann, caused quite a commotion in the geographical world. There could be no doubt that this was the "Ethiopian Olympus" referred to by Enciso in 1518. It was only natural that it should have been discovered first, for its dome-shaped summit was visible from the hills at the back of Mombasa when the

* Proceedings Royal Geographical Society, 1890, p. 120.

weather was clear, and had even been seen out at sea. The discovery of a second snow mountain, the Kenia, we owed to Dr. Krapf.

This pioneer-missionary first beheld it on December 3rd, 1849, from a hill in Kitui, and again in 1851, when he advanced as far as the Tana River. Hildebrandt, who visited Ukamba in 1877, and brought home valuable information, never caught a glimpse of the mountain; and Mr. Joseph Thomson was thus the second European who came within sight of it. He first saw it on October 11th, 1883, from a distance of 60 miles, and again on October 25th, when within 25 miles of it; and its "dazzling white pinnacles" stood out distinctly. Mr. Thomson, he was sorry to say, was now stretched upon a bed of sickness, brought on by the hardships of those African explorations which had brought him so much fame. His work had stood the test of time. He (Mr. Ravenstein) had never found it difficult to combine Thomson's work with that of more recent explorers, whilst the high value of his geological observations had recently been fully acknowledged by the eminent geologists who had edited the scientific results of Count Teleki's expedition.

The first attempt to ascend Mount Kenia was made by Count Teleki and Lieutenant von Höhnel in 1887. Starting from Ndoro (6360 feet), at the western foot of the mountain, Count Teleki attained an altitude of 13,350 feet, which was 3000 feet below the highest summit. As seen from the west the mountain presented itself as a truncated pyramid surmounted by two rocky pinnacles, apparently the ruins of an ancient crater. Its slopes up to 8500 feet were densely wooded; then followed a region of bamboo thickets (8500 to 10,500 feet); next, a region of mosses, within which grew that curious tree, the *Senecio Johnstoni*; and finally, beyond 15,000 feet, the region of perennial snows. The snow, owing to the steep declivities, lay in patches; and hence the Masai name of the mountain, *Doinyo Egere*, which meant "dabbled mountain," was felicitously significant. The declivity of this western slope, up to the point reached by Count Teleki, was very gentle, for it did not amount to 5 degrees, and a carriage-road could thus easily be constructed up it. The southern slope of the mountain, if we were to accept a sketch supplied by Mr. Hobley, presented a very different aspect, for instead of a truncated pyramid, the explorer found himself in the face of a serrated ridge, extending for some 4 miles from east to west. Whether this ridge represented the southern rim of a crater of considerable dimensions future explorations would have to show. The zones of vegetation, however, were the same, and if Mr. Hobley saw no *Senecio*, this was simply because he never got beyond the belt of bamboo thickets. The expedition of Mr. Astor Chanler, with Lieutenant von Höhnel as scientific member, which was on the point of starting for Eastern Africa, would no doubt reveal to us the whole of the topography of Mount Kenia and the surrounding region.

Among the many other explorers who had obtained glimpses of Mount Kenia from a distance were Dr. Fischer (1886), Mr. Pigott, Dr. Peters, Mr. Borchert, Messrs. Jackson and Gedge, Mr. Bateman, Captain Lugard, and other officials of the Imperial British East Africa Company.

In conclusion, he (Mr. Ravenstein) desired to say a few words on the map accompanying this paper. The Tana River, up to Balarti, had been taken from a survey by Mr. Hobley, which was checked by 14 latitudes and 10 longitudes. Mr. Hobley was one of the pupils of Mr. Coles, who spoke highly of his qualifications as an observer. The longitudes were determined by means of a ship's chronometer, which was rated on returning to the coast on board H.M.'s surveying vessel *Stork*, and appeared, therefore, deserving of confidence. Balarti, according to Mr. Hobley, stood in lat. $0^{\circ} 4' 45''$ S., long. $39^{\circ} 2' 45''$ E. Its altitude above the sea, as

determined by boiling-point, was only 460 feet. The Upper Tana and the country extending to Mount Kenia was based upon Mr. Hobley's map, checked by several observed latitudes and a number of bearings of Mount Kenia. All these bearings had been inserted upon the map as given in the original documents, even though they had not been accepted as correct in every case. The position of Kenia was taken from Lieutenant Hohnel's map, and depended upon that of Kilimanjaro. It should be noted that on Mr. Hobley's original map Kenia was placed in long. $36^{\circ} 43' E$. Mr. Hobley had two of Dent's half-chronometers with him; but he had some difficulty in determining their rates, and the results of his observations could not, therefore, be trusted. Mr. Hobley was equally unfortunate with his aneroid. The altitude of the highest camp reached was determined by a boiling-point thermometer. The route from the Tana to Machako's had been laid down from Mr. Hobley's observations. Nearly all the other routes were from surveys of Captain Lugard, Mr. Bateman, Mr. Pigott, and other officials of the East Africa Company. He had also inserted the routes of Count Teleki, Mr. Hildebrandt, and Dr. Krapf; but with respect to the last, he had done so with diffidence, as the position of the village in Kitui, from which that missionary started for the Tana, was a matter of considerable doubt. Krapf, on going to the north, had passed the Mwakini Hills and Mount Date, and if these were identical with the Mwakini Hills passed by Mr. Hobley and the Mount Thata seen by that explorer to the northward, a different direction would have to be given to Dr. Krapf's route.

It was matter of regret that Mr. Hobley had not ascertained a larger number of native topographical names, or even the names of the chiefs. On the other hand, he was to be praised for not having covered his map with a European nomenclature, which would have proved of no service to those who followed his footsteps as an explorer. The few names of this kind inserted upon the map were to be looked upon as merely provisional, and would in course of time be superseded by native appellations. In conclusion, he could only say that the work effected by this expedition, no less than the route surveys made by other officials of the British East Africa Company, had materially added to our knowledge of a large portion of Eastern Africa.

THE PRESIDENT: Mr. Gedge has been known for some time very favourably to the Society by the account of his journey along with Mr. Jackson, which was read here the year before last. To-night we are happy to have seen him, and he has given us a very meritorious paper, and has shown us scientifically interesting photographs. Captain Dundas appears to have done all his work and conducted the expedition with great credit, and I know you will direct me to include him and his immediate subordinates, of whom Mr. Ravenstein has spoken, in the thanks which, I think, you will direct me to give to Mr. Gedge.

*Expedition to the Tahan District, Pahang, Malay Peninsula.**

By H. N. RIDLEY, Esq.

It has been reported by natives and others that in the interior of Pahang lies a mountain known as Gunong Tahan, which is the loftiest in the Malay Peninsula, and is estimated at upwards of 12,000 feet

* The map, reduced from that sent by Mr. Ridley, is simply a map of the Tahan River; Mr. Ridley does not indicate precisely where it joins the Tembeling.

altitude, but, owing to the height of the mountains surrounding it, this has only been seen afar off by one or two explorers, who were unable either to reach it or to locate it accurately. With the view of exploring this mountain an expedition was fitted out by the Government of the Straits Settlements, and it started from Singapore on June 23rd, 1891. The exploring party consisted of Mr. W. Davison, Curator of the Raffles Museum; Mr. H. N. Ridley, Director of Gardens and Forests, S.S.; and Lieut. H. J. Kelsall, R.A., with an adequate staff of zoological and botanical collectors and servants. On arriving by steamer at Pekan, the capital of Pahang, on the Pahang river, the party was joined by a young Australian volunteer, Mr. J. Townson.

Most of the heavy baggage, rice, and stores had been sent on to await the arrival of the party at Kwala Tembeling (mouth of the river Tembeling). Repairs to the boats and collecting the men delayed the expedition at Pekan till the 28th, when it started. Owing to the previous drought the rivers were very shallow, and progress was exceedingly slow, and it proved impossible to travel to any purpose at night. The boats were therefore tied up in the evening, and the camp pitched, during which time till dark, and again in the early morning, before starting, the collectors busied themselves in obtaining such specimens of plants and animals as they were able to find.

At Temerloh it was necessary to obtain smaller boats for ascending the shallower rivers. Here we had to relinquish the largest boat, and transfer all the baggage to small ones, in which we reached Pulan Tawar, the residence of the Sultan of Pahang, on August 9th.

The Sultan put at our disposal the services of Penglimah Yusuf Garang, a chief of the Kwala Tembeling district. We reached Kwala Tembeling early on August 12th, and found the stores and coolies awaiting our arrival. The Tembeling river was very shallow, and we could use only the smallest boats. Of these we had not a sufficient number, so that it was necessary to take up the baggage in two instalments. Lieut. Kelsall and Mr. Townson then took the boats and went with all speed to the mouth of the small river Tahan, taking 2½ days. On the 15th, Lieut. Kelsall, having selected a spot for a camp at the mouth of the Tahan, left Mr. Townson in charge, and returned with the boats to Kwala Tembeling. Meanwhile I was bringing up more stores in some other boats, accompanied by Penglimah Garang. On approaching the mouth of the river I visited the Penghala Raja of the Tahan district, to try to get guides from him, but he was either unwilling or unable to assist us. Nor indeed were we at all able to get any guides or reliable information about the mountain. Indeed, I do not believe that any Malays have visited it, though an important man was sent up there by the Rajah a couple of years before. It was reported that he had got up to the mountain, which he found covered at the top with *Casuarina* trees, and that the only bird that he saw there was the bird known as the Morai,

the black and white robin (*Copsychus saularis*). Further, that he and his men perceived on the mountain two figures: one with a black coat and white trousers, and the other with a white coat and black trousers, and recognising these as *hantus* (spirits) they hastily returned. The only evidence in his story that he had been there lies in his seeing *Casuarina* trees, which are here peculiar to the tops of the mountains and to the sea-shore, and never occur in the intermediate country. The Morai, common in the lowlands, disappeared at Kwala Tembeling, and does not occur at all in the Tahan district.

Tradition also alleged that on the summit of the mountain was a house entirely made of gold, and a monkey as big as a buffalo. Some of the Kelantan men we had with us stated that they had heard that the mountain rose out of a large lake or swamp, from which spring the rivers Kelantan to the north, Kechan to the west, and Tahan to the south.

Further, that there were two routes, viz. the one we took up the river Tahan, and one by the Kechan, but that the latter ended at the foot of a lofty precipice, whence it was impossible to ascend the mountain. All these traditions are, I believe, derived through the Sakais, the wild tribe properly called Temuns, who inhabit this district. The Malays, it is true, visit the Tahan river for guttas, dammar, gharu wood, and rattans; but as they go in boats, the distance they travel must be very short, and they receive most of the produce from the Sakais. By the 18th all the stores were brought up to the mouth of the Tahan, where a big camp had been made, and stockaded to keep out wild beasts.

The country from the mouth of the Pahang river as far as to the mouth of the Tahan is flat and sandy. The rivers Pahang and Tembeling traverse plains covered with short grass and bushes, and small woods farther away. The woods are thicker and denser, but the timber is small. Here and there are swamps and a few rice-fields, but the Pahang Malay is too indolent to do more cultivation than is absolutely necessary for existence. Although the country appears well suited for cultivation, in Penghala Raja's garden were several healthy Arabian coffee-trees, without a speck of the coffee-leaf disease, a great rarity in the Peninsula. He himself, however, was totally ignorant of the use of the coffee-berries, using the leaves only to make tea of. This open country abounds in pigs and tigers, and at certain spots herds of the wild cattle known as *sladangs* (*Bos gaurus*) may be met with. It was at Pulan Tawar that the Sultan drove a herd of *sladang* into an enclosure, and captured the whole. However, the animals on finding themselves caught, fell to fighting so fiercely that all but three were killed. One of these three was sent by H. E. Sir Cecil C. Smith to the Zoological Gardens, where it is still living. The tigers are very destructive to the buffaloes, but rarely kill the natives. Peacocks, jungle-fowl, pigeons, and hornbills are very plentiful, and supplied the

expedition with additional food. The latter birds are very good eating, the flesh being brown and tasting like beef-steak. The elephant and rhinoceros also occur in this district, but are much scarcer here.

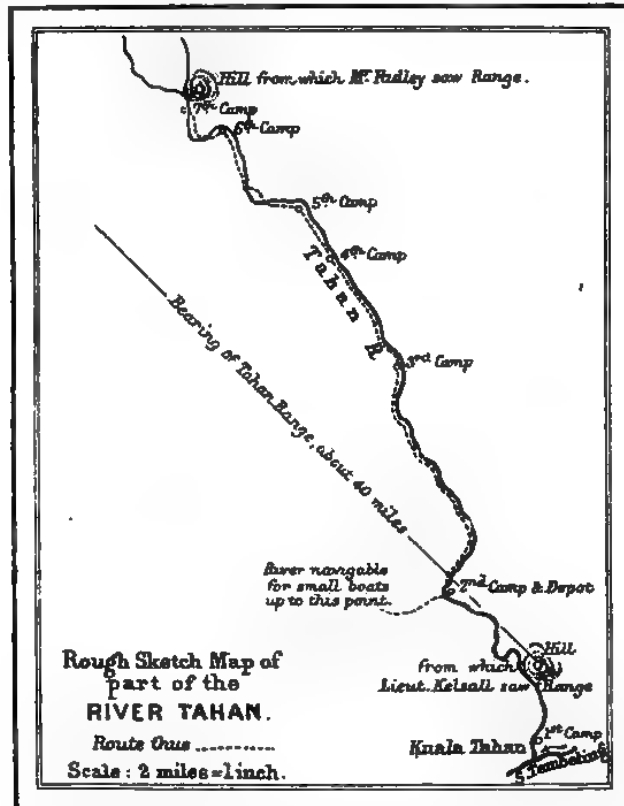
The expedition was well supplied with dynamite, with which no expedition in a region of streams and lakes should be unprovided. From the Tembeling river upwards, the rivers were dynamited every evening and large supplies of fish collected, so that the camp was fed largely on fresh fish. It may be worth noting for any traveller using dynamite for collecting fish, that the charges used should be small, so as to stun the fish rather than kill them outright, as in the latter case they sink and do not come up till they are spoilt for eating. Sometimes over a hundred fish, chiefly of the carp family, would come up after a single explosion.

On August 19th I and Mr. Townson left the Kwala Tahan camp with four boats to journey up the river Tahan and pitched the next camp at the mouth of a small stream called Sungei Tenok (Tapir stream). Though only three miles, it took nearly two days to accomplish this, as the stream was so low down that we had to wade and drag the boats through passages made by piling up the stones at the bottom of the river. This was most laborious work, as the river-bed was covered with slippery round pebbles, and it will give some idea of the difficulties of this part of the route up stream when I say that on the return journey, when the water had risen, we came down this two days' journey in an hour.

While waiting for the arrival of the rest of the party and stores, I explored the hills in the neighbourhood of Sungei Tenok, hoping to get a view of Gunong Tahan, but without success. The Tahan river is, as I have said, a narrow rocky stream, running between hills of about 1000 feet altitude and higher, covered to the top with very dense jungle, full of rattana. The vegetation comes down to the water's edge, and the hills are so close that one can see but a short way ahead. Even sending men to the tops of the highest trees on the highest points of the ridge was almost useless, as the trees were so equal in height that nothing but endless tops of trees could be seen. Lieut. Kelsall, by ascending a very lofty tree at Kwala Tahan, saw the Gunong Tahan ridge for a short time, at a distance of about 40 miles. (See Map.)

At the Tenok river it was found impossible to progress further in the boats, and leaving some men in charge of the camp there, we proceeded along the right bank of the Tahan river, following tracks of the Sakais. Mr. Townson and I preceded the party with a few picked men and cut the path for the coolies, camping one or two days' journey ahead. But progress was very slow, the jungle was thick and wet, and the hills ran at right angles to the river, entailing a ceaseless up and down hill march; the slopes of the hills were often very steep, and in many places the rocks were very difficult for the men. The coolies,

with one or two exceptions, were a miserable lot, dirty, thievish, at times mutinous, and lazy. As we progressed they were greatly in fear of the spirits which they supposed haunted the mountain. Many got sick from dysentery, fever, and beri-beri; and kurap, a horrible skin disease, spread rapidly over the lot. These woods are certainly very unhealthy; every night after leaving Kwala Tenok we had tremendous storms of rain, which saturated everything, and even the tents were not sufficiently waterproof to prevent our getting wet. The ground



and trees were always saturated, and at night the whole of the ground in the forest was illuminated by phosphorescence on the leaves, probably due to bacteria. After journeying like this for some time, on the 31st I ascended a hill on the left bank of the river, and suddenly perceived the big range of the Gunong Tahan, lying about 12 or 14 miles off as it appeared to me. A long broken ridge, densely covered with trees, on one side of which could be seen a great white cliff probably of limestone more or less clotted with vegetation, while to the north rose the

big peak of Gunung Tahan, which I estimate at not more than 10,000 feet altitude. Between us and it lay two or three more high ridges like those we had crossed, and one could see the river winding between them towards the ridge. Descending this hill we pitched the camp on the opposite bank, and awaited the arrival of the rest of the party. During this delay I tried several routes along the river bank, but found them impracticable for coolies, so followed up a Sakai track which ran to the south along a small stream. This stream eventually changed its course to the north, and evidently started from the valley of the Tahan mountain. The woods here were exceedingly wet, the trees covered with sopping moss, in which grew a number of beautiful orchids. Tracks of elephant and rhinoceros were seen, and some of these animals were heard dashing away through the jungle at our approach. Indeed, at the camp we used to hear a rhinoceros walking about close by every night, but owing to the darkness could not see it.

One of the most striking features of these woods was the utter absence of bird life. Here and there in the little side stream one would see the beautiful little wagtail (*Henicurus ruficapillus*), white and red, and perhaps a rock bulbul or so, but otherwise animal and bird life was very scanty to see. The tiger, deer, bear, sladang, peacock, jungle-fowl had all disappeared. A wild pig was seen a good way up the river, but at the furthest point they had all disappeared. A curious yellow monkey was often heard in the early morning uttering a succession of deep sonorous notes, rising in pitch and increasing in rapidity till it ended in a sort of prolonged laugh. It was evidently a new species, but we never succeeded in getting any. The Argus pheasant was still abundant, and I came upon a number of gibbons on one occasion; but innumerable jungle fruits lay upon the ground untouched by monkeys or birds.

At night the frogs in the river made loud and frequent noises. One curious species clung to the rocks in the most rapid and turbulent parts of the stream by suckers on its toes. No snakes were seen, and only two lizards. A great number of rare and new plants were collected, among the most lovely of which were the *Didymocarpi*, with large gloxinia-like flowers, white, crimson, or white with violet or crimson tips to the petals. Many of the plants were typically Bornean, including the genera *Neckia*, *Isoptera*, *Rhyncophyle*, and *Brugmansia*. A very beautiful *Dipterocarpus* tree was plentiful, overhanging the river, with sweet rosy-white flowers scenting the woods, followed by bright pink winged fruits. It is called *Nerrum* by the natives, and is of an undescribed species of *Dipterocarpus*. Among eatable fruits in these woods we found some species of *Nephelium* and *Willughbeia*, and also a large creeper, called by the natives *Akar Panti*, with fruits resembling apples in form and colour and also in taste.

The Champedak, so much cultivated by the Malays, is wild in these

woods. And one frequently met with the Rambutan, but apparently introduced by the Sakais, who, like indeed the Pahang Malays, swallow the fruit whole, and pass the seeds out afterwards, thus scattering the plant over the jungles.

Another plant that must not be passed over was the fine palm, *Teysmannia altiflores*, with its huge ear-shaped leaves, of which the blade is over six feet long. It made excellent shelters for the men at night.

The Sakai tribe, which inhabits the Tahan district, we had hoped to make acquaintance with; but though there were evident signs of their presence in the immediate neighbourhood, they were so timorous that we saw none. In several places we saw sticks and trees which had been cut by them evidently not an hour before; and their sleeping shelters were constantly met with. These usually consisted of two erect sticks with one transverse one, against which palm leaves were set up on end, so as to form a kind of sloping wall. In front of this they made a fire, and sat as near it as possible. At one spot I found seven beehive-shaped huts formed entirely of palm-leaves, inside which could be seen more palm-leaves in which the Sakai seemed to have rolled himself up, the whole thing reminding one of a field-mouse nest. They also build little huts in the trees with ladders to them made by tying sticks transversely to smaller trees. The remains of zurians and rambutans were often to be found by these huts. And at one spot a long rattan was bent round the sleeping place (a more elaborate one made like a bunch of sticks with a shelter on the top), which the Malays said was a charm to keep them away. The Sakais have a great dread of the Malays, who have in times passed killed them and made slaves of their children. Hence their timidity. Mr. Hugh Clifford, the acting President of Pahang, takes much interest in this tribe and has for some time been investigating their language and customs, which are as yet quite unknown. He will shortly publish an account of their language, which is monosyllabic and very simple.

While I was following up this track to get into the Tahan valley, I received a note from Mr. Davison's camp to say that Lieut. Kelsall was very ill with fever, and it would be necessary to delay for some days. So, as our food was running out, I determined to march back to the back camp for more supplies. On my arrival I found that he was indeed dangerously ill, and Mr. Davison was himself suffering from fever, and further that only six days' food was left, and it was ten days at least before we could get the supplies which were coming up from Pekan. Mr. Townson too was attacked with fever, and many of the men were ill. It became obvious that we must retreat at once. I made a little further exploration, and having loaded up the men with as many specimens and live plants as we could carry in addition to the baggage, we retreated on the Kwala Tenok camp, where we found enough provisions to carry us on for a few days till we reached civilised districts

where we could obtain more. The expedition returned to Singapore on September 5th.

The failure to reach Gunong Tahan was due chiefly to the failure of the commissariat. Food for two months was taken, the time allotted by government, which was exceeded owing to the great difficulties of the route. The amount that the coolies can carry through this jungle is very small. Two men can carry little more than food for thirty men for one day, so that for ten days, out of thirty men twenty are required to carry food for themselves, and only ten remain for the baggage.

I shall hope soon to try the expedition again, taking the same route, but sending a plentiful supply of provision forward as far as the Tenok river, and making a headquarters store there.

The route was mapped by Lieut. Kelsall, and a copy is appended. Although the two chief plant collectors were ill during the most important part of the expedition, with the aid of the third I succeeded in obtaining a large series of herbarium specimens, over 2000, besides live plants, cuttings, and seeds. An account of these will shortly be published. In the zoological collections many birds, including several new species, a small number of mammals, chiefly squirrels, and insectivora, a good number of insects, reptiles, fish, mollusca, &c., were obtained. Several nests and eggs hitherto unknown were also obtained.

*Emin Pasha's Expedition to Lake Albert Edward and
Lake Albert.*

THE latest telegrams announce the safe return of Emin Pasha to Bukoba, on the Victoria Nyanza, from his journey to the Lake Albert Edward Nyanza and the Equatorial Province. A preliminary account of this important expedition is contributed to the June number of Petermann's 'Mitteilungen,' by Dr. F. Stuhlmann, who accompanied Emin. The object of the expedition was twofold: first, to ascertain whether the Lake Albert Edward extended to 1° south latitude, and to explore the country in the vicinity of the lake; and secondly, to open up communications with Emin's people, who had, it was understood, wandered south-westwards from Wadelai. On March 22nd, 1891, Emin left Kafuro, followed on April 1st by Dr. Stuhlmann with the rest of the caravan. The general direction of the route was north-north-west. At Kivona, Stanley's route was left to the east, and the party descended to a valley plain about 4130 feet high, which swarmed with rhinoceroses; to the north of this plain are two small lakes without outlets. Nearly all the mountain ranges which were now crossed slope away gently to the west, but abruptly and with precipitous rocks to the east. Descending into the plain of the Kagera River, a halt was made at

Kavinyo, on the banks of the stream, here about 30 yards broad, to enable the two sections of the caravan to unite. The march to the lake was then continued through the mountains of Mpororo, which consist of primitive slate and granite; the intervening valleys everywhere contain papyrus swamps. Proceeding in a general north-west direction across several mountain ranges, from one of which a glimpse of a snowy range to the north (probably Ruwenzori) was obtained, the party reached Katanyo on April 30th, having passed on the borders of Ruhanda a small lake (Ruaketonyo), situated in a broad valley.

After crossing the high mountain range, Kyenkezi was reached, and then, in a few days' march, the River Ruchuru, which flows out of a broad savannah-covered southern valley into the Lake Albert Edward, where a few hours later the party arrived, and halted at Vichumbi, at the south-west end of the lake ($0^{\circ} 44' S.$). Vichumbi is a place of some 2000 inhabitants, which carries on the trade with Usongora by boat, and with Ruhanda by land. The lake contains neither crocodiles nor aetheria. Its altitude above the sea is 2850 feet. The whole country to the south of the lake, here called Ngezi,* is a flat savannah. Down the south-western end two broad plains stretch away to the south, both being separated from Buitwa by the Kasali Mountains. The eastern plain, which is the larger of the two, is watered by the Ruchuru, and the other by the Ruanda River. The former plain is bounded on the east by the lofty mountains of Butumbi, Mpimbi, and Mpororo, and on the south by a low hilly region, from which rise isolated cones with steep and rugged sides. The most easterly of these summits is designated "Mfumbiro" by the Waganda and the people of Karagwa. These peaks, of which there are six, stretch to west-south-west from about $30^{\circ} 0' E.$ long., and are undoubtedly volcanic. The highest, Kisigali, is also the most precipitous, and Dr. Stuhlmann estimated its altitude at about 13,000 feet.

The most distant and westerly of the volcanoes, viz., Virunyo Viagongo, is, according to all the native reports, still active; it lies in the district of Ruhanda, and the others belong to Mpororo. This interesting region, containing the head-waters of the Ruchuru flowing to the north, and apparently those of the Kagera flowing to the south, is probably well watered and rich in vegetation, and presents a fine field for future exploration. The most southerly point of the lake lies at the present time at $0^{\circ} 45' S.$ (lat.), but it appears to vary very considerably, according to the rainfall. The people of Vichumbi state that their parents were obliged to build their huts close up to the mountains on the west. On May 15th the march was continued round the south-west and

* "Ngezi" merely means river, or small lake. According to Mr. Stanley, Beatrice Gulf is called Ngezi (Ingezi), the lake itself being known as "Ruweru," Muta Nuge, or Nyanza of Usongora. Casati has Rutan Ngeze.—E & R



up the western coasts of the lake; the mountains gradually approach the shores, and finally in the north slope almost perpendicularly down to the water's edge. At Kirima, a little to the west of the debouchure of the Semliki (here named Isango), the expedition left the lake, and struck across the steppe country to the mountains on the west, but, later on, turned to the north-east, partly to avoid the great bend of the Isango, which is bordered by virgin forest, and partly to explore the snow mountains on the other side of the stream; and after crossing the Isango on June 3rd, here about 60 yards broad, and $1\frac{1}{2}$ to 3 feet deep, arrived at Karevia (3850 feet), at the foot of the mountains, and the outlet of the Butagu valley.* In the steppe bush of the Isango plain numerous elephants were seen, the first which had been met with by the expedition since leaving the coast. Dr. Stuhlmann made several attempts, during the next twelve days, to ascend the mountain, but could not reach the snow-line, as his men suffered so much from the cold. The highest point attained was about 12,500 feet. The mountain is composed for the most part of mica-slate and partly of old granitic eruptive rocks, and appears to consist of a number of parallel chains running north-north-west and south-south-east; but the observations made, when worked out, will reveal more exactly the construction of this great mountain mass.

Dr. Stuhlmann distinguishes the following belts of vegetation:—

1. Bananas; high grasses (*Panicæ*): 3850 to 5350 feet.
2. Colocasia and beans cultivated; high grasses; upper limit of settlements: 5350 to 6700 feet.
3. Deciduous forest; in its upper parts *Erica*, mixed with bamboos: 6700 to 8530 feet.
4. *Erica* forest, with bogs; species of *Vaccinium*: 8530 to 11,800 feet.
5. *Erica* bushes; *Rhynchopetalum* (6700 to 12,800 feet); tree-ferns; *Senecio* (10,200 to 12,500); *Helichrysum*, a little grass, mosses, lichens: 11,800 to 12,500 feet.

The snow-line was estimated at about 13,000 feet.

At a day's march north of Karovia the party entered the forest region, and continued along the eastern side of the Isango-Semliki valley, crossing the stream somewhat above Stanley's point, and then striking in a due northerly course through Mboga Land. The Lu, or Lulu, which waters the country, and is traced on Stanley's map to the Ituri, should, according to the natives, flow into the Semliki. In this region several encounters took place with Kabrega's people. At Undusuma, a camp was pitched from July 20th to August 10th, and communications were opened up with the Sudaneses who had settled

* The Butagu (Butahu) Valley is shown on Stanley's map. Captain Lugard was there at the end of July looking for German flags, but found none.—E. G. R.

between Kavalli's and Mpigwa's.* Dr. Stuhlmann briefly narrates the events which took place in Wadelai after Emin left, and describes the present condition of affairs in that region. Fadl ol Mulla has established himself at Wadelai, and appears to make common cause with the Mahdista, whose headquarters are in Makaraka. Selim Bey was encamped at Kavalli's. He discovered, accidentally, the ammunition buried by Mr. Stanley. The steamers have been sunk, the country of the Lur has been wasted, and the inhabitants are, moreover, being harassed by slave-raiders from the Congo State. From Undusuma the expedition marched to the north-west, across the River Duki, a tributary of the Ituri, then northwards over a plateau down to the forest bordering the Ituri River, which here flows almost due south, and contains numerous rapids. The travellers followed the Ituri up to the borders of the Wavira country, about $1^{\circ} 50'$ N. lat., and then intended to penetrate into the unknown region to the north-west, but were prevented by the hostile attitude of the natives. The slave-raiding Manyema hordes of the Arab Selim-bin-Abd from Nyangwe had devastated the whole country. It was therefore decided to return across the Ituri.

The journey was then continued to the east, through the territory of the Wambuba, into the grass region of Lendu, and finally to the north through a country watered by numerous deep-bedded streams, which unite to form the Abumbi, an important head-stream of the Ituri. Somewhere about $2^{\circ} 13'$ N. the border of the Momvu country was reached; but as the whole country had been laid waste by the Manyema, and there was no guide to be had, or prospect of obtaining food, Emin reluctantly decided on September 30th to beat a retreat. A native who could speak Momvu assured the party that in three days' march they would come to a great River Tsili, which would have to be crossed in boats, and on the other side of it to the Momvu district of Muba, containing much cattle, then in two or three days to the River Andemari—the latter must be the Bomokandi.

Dr. Stuhlmann puts the head-waters of the Ituri at about $2^{\circ} 40'$ N. lat. and $30^{\circ} 20'$ E. long., but those of the Bomokandi much more to the north. Distant mountain ranges, seen from the most northern point attained by the expedition, may be regarded, according to him, as the watershed between the two streams. It should be stated, in connection with the decision to retreat, that the expedition was encumbered with a number of women and children, who were among the 182 Sudanese who joined the expedition of their own accord at

* During Emin Pasha's absence in the north, Captain Lugard arrived at Kavalli's, and took away with him Selim Bey and the rest of the Egyptians. Three hundred of these have since reached the coast, whilst others garrison Forts George and Edward, near the Albert Edward Nyanza.—E. G. R.

Undusuma. The return journey through Lendu land to the slope of the Lendu table-land, and then south, was attended with great privations and difficulties. The party finally crossed the Duki at Bilippi (1° 32' N.), and arrived again in Undusuma on November 12th, where the caravan, exhausted by hunger, wounds, and smallpox, halted for some time. As regards the hydrography of this region, the Ituri flows almost due south, and receives most of its tributaries from the east. Here is to be seen one of the elongated depressions which are so characteristic of the orography of Eastern Africa, although the rocks do not belong to the primitive slate formation, but are of eruptive origin.

The Duki also flows from the north or north-west. The same parallelism is noticeable in the case of the Dui and Ihuru, discovered by Stanley. The Lendu plateau is a rolling upland of from 4000 to 5000 feet, with rounded hills and ridges rising from it; its slopes to the east and west are very steep. On the south-west it is separated from the Walegga high land by the Duki Valley; but eastward, near the lake, the two are connected. From the south-west a flat upland extends, forming the watershed between the Ituri and the Lu. Dr. Stuhlmann made a short excursion to the Albert Nyanza. The lake has shrunk again considerably, so that Kassenya and Nyamsasi have become peninsulas, and a number of sandbanks have appeared. The Semliki flows into the lake much further to the west than shown by Stanley. Owing to the continued sickness in the caravan, Emin, who was himself ill, and almost blind, decided to remain for some time longer at Undusuma, but directed Dr. Stuhlmann to push on with the healthy members of the party. On December 10th Dr. Stuhlmann left Undusuma, and marched along practically the same route as before to Kiriamo, then down the west bank of the Semliki to Kinyawanga (6° 27' N.), where he pitched a camp close to the forest boundary, intending to await Emin's arrival. However, Emin not having arrived by January 15th, and there being no tidings of him, Dr. Stuhlmann, acting on instructions, pushed on as fast as possible in the direction of Bukoba. On January 26th he arrived at Vichumbi, at the south of Lake Albert Edward, and finally, by a more southerly but more difficult route than on the outward journey, reached Bukoba on February 15th. On the way through Mpororo he caught a glimpse of the so-called "Mfumbiro," named "Virungo" by the natives of Mpororo; he estimates its altitude at 11,500 feet. All the rivers from the region flow into Lake Albert Edward; the most important of them is the Isasi. There are some interesting notes in Dr. Stuhlmann's article on the ethnography of the region traversed.

Bantu tribes appear to extend as far north as the Upper Ituri, where the Wavira occupy both banks of that river. They, as well as their neighbours, the Wandumba and the Babusese, as also the Wakumu, lower down on the Ituri, are collectively known as

Wasongorè, from their custom of filing the teeth to a point. The people of Unyavongo, to the west of Ruhanda, are also said to be Bantu, and to speak a language akin to that of the Warundi, on Lake Tanganyika.

Non-Bantu tribes, or "negroes," occupy a far larger area than the Bantu. The Walogga, according to Dr. Stuhlmann, are the descendants of the Wichwezi, who were driven out of Unyoro. They call themselves Drúgu, and are kin of the people of Lendu (the Drudu), the Wamonfa, the Logo, Kalika, Lubari, and Madi. The Momvu have kinsmen in the Walese (on the Ituri), and the Wambuba (west of the Semliki). The Walumbi, to the west of the Wakonjo, on the Lindi, are related to the Mangbatu. The Wahóko, a forest tribe on both banks of the Ituri and on the Semliki, are likewise described as "negroes." Further south, the Wakonjo occupy an extensive region to the west of the Semliki and the Albert Edward Nyanza. The Wawamba, to the east of the Semliki, are their kinsmen, as is also the bulk of the population of Butumbi and Western Mpororo (the Walenga, Wajerra, and Wasigáwa), and the aborigines of Ruhanda.

The Wahuma are the "royal" tribe in most of these territories. In eastern Mpororo they are known as Wasambo; in Western Mpororo as Rubayana; in Ruhanda, or Unyavungo, as Waima or Wanyavingi (according to Stanley).

Lastly, there are the dwarfish tribes, whose chief centre appears to be the forests in the Upper Ituri, although they are found also further to the south or the west of the Wakonjo. To the Walese and Momvu they are known as Efe; to the Wavera as Baiswa; to the Walumbi as Akka; to the Wanyoro as Watua; and to the Wakonjo as Wasumbo.

The details of the results of this important expedition will be awaited with interest.

The Beni Amer Country.

THE Governor-General of the Red Sea Littoral, Lewa Helled Smith, C.B., and Bimbashi Reginald S. Curtis, Superintending Engineer of the Suakin District, made a journey into the Beni Amer country in February, 1892. The reports of both officers, with the accompanying map, here reproduced on a smaller scale, are important contributions to the geography of the little-known country lying back from the Red Sea coast. The journey was made on camels, and the jarring of the aneroids by the motion prevents the heights recorded from being as accurate as they might otherwise be.

On February 4th a landing was made at Akik-el-Sogheir, where there is a good harbour and a village of about 300 inhabitants, chiefly fishers and herdsmen. A road running across a plain covered with tall

grass and bush, at the foot of the eastern spur of the Jebel Hedarbe, leads to Adobena, a village of the same size, inhabited by cattle breeders. Here there is a good supply of water. The island of Bahlur, lying opposite, contains several water-holes, the water in which is slightly brackish. Thence the expedition passed south-westward up a large valley, the Khor Hamalieb, in which the water supply was small and bad. Luxuriant grass well adapted for cattle was found, and the mimosa bush was so thick that the route could not be mapped with certainty. The valley gradually contracted, and the path became so narrow on the second day's journey that a camel had difficulty in following it. The hills were covered with trees 20 feet high, rising from dense undergrowth. This was the case up the continuous valleys of Khor Addega and Khor Andel, where a little running water was occasionally met with; but on the 7th a pass, known by the generic name Agaba, was crossed into the Khor Shellalat, from which the Khor Marshail was reached, and followed up to the height of about 3000 feet. On crossing this pass the dense vegetation ceased, the hills rose in crags of barren volcanic rock, and the bed of the khors was covered with stones, a few bushes and some grass bordering the occasional pools or trickles of running water. At the approximate height of 4300 feet the ruined village and graveyard of Abundun was reached. Its site is a little shrubby waterless plain, into which the tortuous Khor Marshail widens.

Leaving the Khor Marshail, along which is the road to Massawa, the expedition turned up the Khor Araram, which is flanked with precipitous shrub-covered hills, and the path became so bad that camels could proceed no farther. From this point a mountain (about 6500 feet above the sea) was climbed. The summit was found to be a plateau, on which there were several graves resembling those common in Abyssinia; the plateau was covered with grass, and there were some trees and water-pools. The native name of Jebel Haggar is discarded on the map, where the hill is dubbed Jebel Inglizi. The return journey was made down Khor Marshail to the confluence of Khor Adhar, the valley gradually widening. The main valley continues north-westerly towards Tokar, but the expedition turned off to the north-east down a khor across the belt of grass and mimosa, and regained Akik-el-Sogheir on February 14th.

The Governor-General gives an excellent summary of the conditions of the country traversed, and the tribes inhabiting it, from observations made on the journey and information received from natives.

The Beni Amer country, from Adobena as far as the frontier between Egyptian and Italian territory at Ras Kasar, is a well-grassed nearly level plain from 5 to 15 miles wide, and intersected with numerous khors. The inland boundary of the plain is mountainous country, rising in a succession of steep ridges, with deep valleys full of rich grass,

bushes, and trefoil clover. The trees are higher as the altitude of the land increases. Torrents flow down the valleys during the rainy seasons, but in the dry season running water is rarely met with except among the mountains, and only water-holes are found within a day and a half's march of the shore. The fertile belt is crossed in two and a half days' journey, and its border is sharply marked where luxuriant vegetation ceases and barren desert begins. The local distribution of the sea mists may account for the sharpness of the transition.

The grass in the fertile belt often exceeds 5 feet in height, and is mixed with mimosa and other bush. On the barren mountain slopes the bush is scanty and ragged, though grass and tamarisk are found in the khors near running water. In the ascent to the plateau of Jebel Haggar, a zone of candelabra trees is passed through, and on the plateau itself the thick grass is diversified by large and old trees of the cypress family.

The Beni Amer people claim to be descended from the Fungs or Funs, who came, they say, direct from the east coast of the Red Sea. Sheikh Medani of Suakin, who is well-informed in local traditions, says that they came from Arabia a thousand years ago, and settled in the country from Erkhowitz northward, subsequently conquering their present territory from the Abyssinians.

Many remains of masonry in good condition occur in the country. There are two classes of house, both built of stone without mortar. The first type, well represented in Abundun, is circular, the ground plan being about 10 feet in diameter, and the stones overlapping inward, so as to form an arched roof. The height is about 10 feet, and a hole left in the roof was evidently the entrance. The second type is square, about 10 feet in the side, and similarly built, only there is an entrance about 2 feet square on the ground, and projecting stones are left to afford access to the roof. In Abundun, a taller building of similar construction was found at each end of the village; these were evidently designed as watch-towers.

Tombs appear to have been the object of much attention. Some, probably of later date than the buildings referred to, are enclosed in a circle of stone slabs about 30 feet in diameter, the middle of the wall being pure white quartz. An oblong block in the centre covers the grave, and occasionally two graves are surrounded by one wall. On the Jebel Haggar there are some cruciform enclosures, with two graves in the centre; these are probably of Abyssinian Christian origin. At Assara Madihadi there are some well-preserved tombs built with mortar, and probably Mussulman. The existence of a large cemetery at this place is evidence that a town of considerable size formerly occupied the site, and remains of watch-towers stand on the neighbouring hills.

A group of remains, suggesting a line of defence, occupies a slightly rising ground at Akik-el-Soghier, about 2 miles inland. This may be



the site of Ptolemy Pheron, mentioned by Strabo, as he records that near there was a large island where olives grew; this may be Bahdur, than which, with the exception of Er-ri, also lying off this part of the coast, there is no island of any size nearer than the Massawa group. In both islands there are very old cisterns arched over, and in Er-ri two stones (basalt, which must have come from the mountains inland) were found bearing inscriptions in ancient Arabic.

Fourteen sub-tribes of the Beni Amer are enumerated, with their former headquarters, but the country is now deserted except at Akik-el-Soghier and Adobena. Two years ago the mountain district was prosperous, but the dervishes have driven the inhabitants south towards Senbet. The Beni Amer are all cattle-owners, and there is little agriculture, any suitable spots on the small mountain plateau being invariably used for cemeteries.

The Glacial Catastrophe in Savoy.

MOUNTAIN regions are subject to many sorts of sudden disasters, but the terrible catastrophe in the Haute Savoie, which has lately caused so lamentable a loss of life at the Baths of St. Gervais, is of a kind happily rare, even among snow-clad ranges. It was brought about by an inundation, which, however, must not be confused with the inundations, similar in nature and effect, but not in origin, which are caused when a glacier advances from a lateral glen across a main valley, dams its stream, and thus creates a lake, which eventually bursts. Such accidents have occurred among the Alps in the Val de Bagnes (Glacier de Gétroz), in 1595 and 1818, and in the Ötztal (Vernagt Glacier) several times both in the last and present centuries (see Ball's 'Alpine Guides'), and more than once in the Valley of the Indus (see Drew's 'Jummoo and Kashmir'). From such catastrophes the recent outbreak was quite distinct. Mr. Ball writes:—"Comparatively small glaciers, lying on a steep rocky slope, have been known, in a few rare instances, to detach themselves wholly or partially from their beds, and to fall into some lower valley." And he instances the destruction of Rando, in the Zermatt Valley, by the Bies Glacier in 1819. This is, apparently, what happened in the chain of Mont Blanc, with the addition that the fall was accompanied by a flood of water capable of carrying the mischief to a great distance. The nearest parallel, probably, may be found in the Caucasus, in the disastrous floods which have several times swept out of the Devdarak glen, under the north-eastern face of Kasbek, and destroyed, after a course of several miles, the high road in the Daricl gorge. These the Russians have described as "the avalanches of Kasbek," and I well recollect Sir Frederick Murchison's interest and surprise when I was, in 1858, able to describe to him the locality and the true character of the sudden outburst of ice and water.

The recent catastrophe may most exactly be described as the explosion of a glacier by the stoppage of the sub-glacial water-channels which drain it. All glacier explorers are well aware that the ice does not melt only at its lower extremity; strong streams flow along the surface of the upper névés, and tumble down the shafts known as moulins, to the rocky floor on which the ice rests. Their volume is sometimes proved by a great waterfall bursting out of the side of the ice, as the Arveiron once did below the Montenvers; or, as may be seen often, the drainage of a large lateral glacier is barred, after a short course under the open sky, in

the ice-stream of the main valley. These sub-glacial streams are busy at work eroding deep and narrow channels. Examples may be examined where the ice has recently retreated, e.g., on the Eiger Glacier, close to the Wengern Alp, or at the Rosenlani Glacier. This fact—the erosion by water going on under glaciers—has been little noticed by travellers, or in scientific handbooks and treatises.

It stands to reason that when the bulk of frozen matter descending the mountain-side is confined by narrowing slopes, when it has to pass through a funnel, there is a greater risk of these sub-glacial vaults and channels being stopped or choked. This risk will be further heightened when the bulk of descending ice is on the increase. It may be remembered that last year (see 'Proc. R. G. S.' vol. xiii., p. 682) I pointed out that the *névés* on Mont Blanc were swelling, and that to an extent that renders the ordinary route across the Petit Plateau dangerous on account of avalanches from the Dôme du Gouter.

The Glacier de Bionnasset, the main source of the stream, down the bed of which the destroying flood recently poured on St. Gervais, flows from the horseshoe under the northern cliffs of the Arguille, of the same name, and the Arguille du Gouter. It was by its flanks that De Saussure and Bontrit made their early attempts to ascend Mont Blanc, and their tracks are now followed by climbers who take what is known as the St. Gervais route. Otherwise the glacier is little visited. It has a steep and rapid course in its upper portion, falling some 3000 feet from the base of the Arguilles to a comparatively level pasture, on which its lower extremity rests. On its right, or north bank, it is confined by a flat-topped, rocky ridge—La Tête Rousse (*circa* 9000 feet). North of this ridge lies a small glacier, which no one that I know of—since De Saussure—has thought worthy of mention. Flowing from under the ridge that divides the Bionnasset basin from the Valley of Chamonix, it gives birth to a small torrent—easily stepped over by a child even on a warm afternoon—which falls very rapidly down steep rocky slopes and sheep pastures into the Bionnasset Glacier. De Saussure, who bivouacked at its base, speaks ('Voyages,' vol. ii.) of this little glacier—now distinguished as the Glacier de la Tête Rousse—as "a small glacier covered with snow, from which issues a clear and fresh stream, which served all the needs of my party." Its torrent does not enter the Chamonix Valley, but turned west by the ridge of the Prarion falls for three miles through a steep glen to join the Bonnant, or Contamines stream, at Bionnay (3200 feet). The Bonnant then flows through meadows, and gradually sinks into a wooded cleft as it approaches the village of St. Gervais. It is crossed above the village, which stands safe and high on the hillside 600 feet above the Baths (which are 2000 feet above sea-level), by a bridge of a single arch, at a very great height above the water. This has escaped injury. Below this is, or was, the broken arch of the old bridge, which carried the track used from ancient times until quite recently as one of the accesses from lower Savoy to the Valley of Chamonix. A Roman boundary-stone has been found close by on the Forclaz. At this point, by a sudden plunge of about 500 feet, the Bonnant reaches the bottom of a deep, narrow dell, which half a mile lower down, some six miles from the end of the Bionnasset Glacier, opens into the valley of the Arve. Close to the foot of the fall, beside the torrent, stand the Baths, established in the first decade of the present century. The village of Le Fayot (1950 feet), the halting-place of the Chamonix diligences, lies in the open valley of the Arve, at the mouth of the glen, which is exceedingly narrow in its upper portion—not 100 yards wide at the Baths. Part of the building stood immediately above the water.

This insignificant glacier of the Tête Rousse proves to have been the source of the outbreak. The only first-hand account of it as yet received is that given by the Sous-Guide-Chef of Chamonix, who went with two comrades to visit the spot, a three

On a walk from the well-known "Pavillon de l'elève," The following is the guide's official report:—"The avalanche of ice and water proceeded from a lake formed under the Glacier de la Tête Rousse, at the foot of the Aiguille du Gontier. The front of the glacier is something over 330 feet in width, and 100 in height; it has been broken off perpendicularly by the pressure of the water. There is now under the ice a cave some 115 feet in breadth, and 50 in height. We were unable to ascertain its extent. Close to the mouth of the cavern we found snow lying. This led us to suppose that the water had been thrown out with such force as to form an immense cascade, leaping over the rock (?). There is no further danger at present on the St. Gervais side, and a ridge of rocks protects the Valley of Chamonix."

This note is not as clear as could be wished on all points; but it makes the source of the disaster certain, if not all the peculiarities that made it so fatal. The agent of devastation was, in fact, an avalanche riding on a flood. The fronts of many small glaciers give way and fall, but their impetus does not take them beyond at worst the shepherds' huts; this swept unchecked for at least 6 miles. The question which is difficult to answer is, how did a force of water sufficient to act as carrier to so much solid matter accumulate beneath so small an ice-field? Its own drainage is insignificant, and if bottled up by movements of the ice in one place, would almost certainly find another exit. Is it possible that the "clear water" issuing from the ice, mentioned by De Saussure, points to some sub-glacial spring or reservoir, which may have been pent up? This, however, must be regarded rather as an ingenious conjecture than as a solid hypothesis. But the theory put forward by the distinguished naturalist, M. Forel, that the heat generated by the first fall of the ice down the slope of 3000 feet to the plain on which the lower portion of the Bionnasset Glacier rests, was sufficient to turn it into water, is contrary to experience, and cannot be accepted. The Bies Glacier did not turn to water in its fall, nor do the avalanches that fall an equal height on the cliffs of the Wetterhorn. The ice is, in fact, broken into fragments, which reconsolidate, when they reach level ground, into a solid bank. It is very much to be desired that some traveller, with a practical and scientific knowledge of glaciers and their behaviour, should as soon as possible carefully examine the spot.

The hour of the catastrophe confirms a conclusion I have drawn from much experience—that the coldest as well as the hottest moments of the twenty-four hours are those when most avalanches fall. The cause is obvious. The destructive force of melting is fully equalled by the splitting caused by the freezing of water in the ice-veins.

It is obvious that both Bionnay and the Baths occupied the worst positions possible, where the flood would have its greatest velocity and be most concentrated. Le Fayet was exposed by another cause—the relative height of the bed of the stream, raised on ancient detritus, above the houses on its left bank. But much that has been written in newspapers with regard to the recklessness of building on such sites is mere after-the-event wisdom. The Bonnant is a friendly stream: its banks fringed with foliage bear witness to its usually quiet habits. No similar catastrophe is recorded to its discredit. For ninety years the Bath-house had never been in peril. A Paris journal suggests that an Inspector-General of Glaciers should be appointed, to prevent similar catastrophes in future. He will have his work cut out in seeing to every out-of-the-way glacier of the French Alps! Such a proposal shows to what an extent belief in State regulation extends among our neighbours. Another newspaper suggests that there need be no fear of a frequent recurrence of such disasters as the Government have taken in hand the re-forestation of the French Alps! Such are the dangers of a little knowledge. The practical lesson to be drawn from the catastrophe is, that

in mountain regions the mildest-mannered torrent should not be made too close a neighbour.—[D. W. F.]

Postscript.—The Chamonix guide and traveller, François Devouassoud, sends the following account of the result of a visit just made by M. Vallot—well known for his scientific researches on Mont Blanc, and as the originator of the observatory named after him near the top of the mountain—to the scene of the outbreak:—“On the little Glacier de la Tête Rousse M. Vallot found that two basins of water had formed, the upper being the larger. The upper basin first gave way, and its contents poured into the lower, which then broke through a barrier of ice 130 feet thick, forming an opening of 130 feet, a sort of gorge or cave. According to M. Vallot's estimates the avalanche contained 3,600,000 cubic feet of water, 300,000 cubic feet of ice, and collected in its descent 11,000,000 cubic feet of debris. Its depth is put at 20 feet, width 160 feet, and length 3300 feet. It fell first, not on to the Glacier de Bonassat, but down the bed of the little torrent of the Glacier de la Tête Rousse, on to that pretty level meadow you know well.

“It is reported that the little torrent had been dry for two months; but as no one had climbed Mont Blanc by the Aiguille du Gouter this year, the lakes on the glacier had not been noticed, and no steps were taken to drain them. Everyone says no similar disaster has ever been heard of.”

Except that it is not yet made quite certain whether the lakes were on or under the surface of the glacier, this account is clear and definite. M. Vallot's full report will be awaited with interest. M. Tauraz will photograph the spot as soon as the weather permits, and send copies to the Society.—[D. W. F.]

GEOGRAPHICAL NOTES.

Admission of Ladies as Members.—The Council has resolved on a step that has been for some time under its consideration—to throw open the Fellowship of the Society on the same terms and conditions to both sexes. The increasing number of ladies, eminent as travellers, and contributors to the stock of geographical knowledge, and the number of women now interested as students, or teachers, in our branch of science, coupled with the evidence brought forward of a desire among both classes to enjoy the practical privileges conferred by our Fellowship, were, in the opinion of the Council, sufficient reasons for at once making the proposed extension, which will, it is believed, be to the advantage of the Society, and meet with general approval among the Fellows.

Death of Miss Cracroft.*—In the death of Miss Sophia Cracroft, which occurred on June 20th, Arctic authorities of all nationalities will recognise that a striking personality has been removed from among them. The niece of Sir John Franklin, she was brought up from

* By Admiral Sir George H. Richards, K.C.B.

her early years as one of his family, and inherited from him that strong interest in Arctic discovery, which remained the ruling feature of her life. On his departure, in 1845, in command of the expedition for the discovery of the North-West Passage, which was doomed never to return, Miss Cracroft became the devoted friend and sole companion of her aunt, Lady Franklin, until the end of her eventful life in 1875. During the long years of doubt and anxiety which elapsed, until the fate of the missing *Erebus* and *Terror* was cleared up by the discovery of the remains of the perished crews in King William's Land, in 1868, these two devoted and resolute women never swerved from the one task they had set to themselves, viz., by every possible exertion and sacrifice of their own, to promote and encourage the search, by private means, in addition to the many public expeditions which were sent forth by the country with that object. There can be little doubt but that it was mainly owing to their untiring labours that the United States expedition, under De Haven, was sent out at the expense of Henry Grinnell, an eminent citizen of New York, and that the Hudson's Bay researches, under Dr. Rae, brought to light the first clue to the scene of the last fatal disaster. Other private enterprises initiated by them, and finally Lady Franklin's own expedition, assisted by her friends, and carried out so ably in the *Fox*, under MacClintock, set the question at rest for ever. The great desire of Miss Cracroft's latter days was to place on record the remarkable career of her distinguished relative, Lady Franklin, for which her literary abilities so well fitted her; but failing health, and latterly the almost total loss of her eyesight, rendered the task an impossible one. She leaves many friends in many lands, who will appreciate her worth and mourn her loss.

Columbus Celebration at Hamburg.—An influential committee has been formed at Hamburg to arrange for a suitable celebration of the 400th anniversary of the discovery of America by Columbus. The programme includes the publication of a memorial volume containing papers on early German transatlantic trade; festival gatherings on the forenoon of October 11th and the evening of October 12th, when appropriate speeches will be given by a selection of delegates from all German universities and geographical societies; and, finally, an exhibition, which will be open for the first three weeks of October. The exhibits asked for are books, maps, globes, nautical instruments, and other things in use at the period of the discovery of America, as well as objects illustrating the present-day development of America—modern pictures, books, and charts. Early notice of the contribution of articles for exhibition is requested to be given to Herr L. Friederichsen, Neuerwall 61, Hamburg.

Chair of Colonial Geography in Paris.—The French Privy Council, on the initiative of M. Jamais, Under-Secretary of State for the

Colonies, has authorised the creation of a Chair of Colonial Geography in the Sorbonne.

French Geographical Conferences.—M. E. Anthoine will be the President of the Geographical Section of the French Association which meets this year at Pau from September 15th to the 22nd. The Annual Conference of French Geographical Societies will be held at Lille, the sittings being opened on August 1st. Four main subjects have been put down for discussion. 1. French colonisation: The rights and duties of the mother country. 2. French protectorates: Past history, present conditions, and future progress. 3. The part of great companies in developing colonisation. 4. The teaching of geography and cartography in France: Programmes, methods, and results obtained.

The Permanent Winds of the Globe.—In the Bakerian Lecture for 1892, of which an abstract appears in the 'Proceedings' of the Royal Society (vol. li., p. 42), the late Professor James Thomson discussed the grand currents of atmospheric circulation. In a valuable historical introduction attention is recalled to a paper read by George Hadley to the Royal Society in 1735, in which the theory of atmospheric circulation now adopted was expressed with remarkable clearness. Maury's somewhat fantastic theory of the trade-winds, published in 1855, struck Professor Thomson as so insufficient, that he devised a new theory, directing the attention of meteorologists to Hadley's work, in 1857. This theory, which is also claimed in its main features by Ferrel, is undoubtedly due to Thomson and the earlier English worker; and it is fitting that it should be placed on record here. The practical knowledge of the trade-winds is all-important in navigation, and the correct theory is hardly less interesting to the geographer than to the meteorologist. The theory, as summarised in the abstract, is as follows:—

"That at the equator, or near to it, there is a belt of air ascending because of its high temperature and consequent rarefaction; that its supply of air is maintained by influx from both sides towards the zonal region at its base, which is a region of diminished pressure; that from its upper part currents float away to both sides, northward and southward; and that these currents continue in the upper regions of the atmosphere, each of them advancing towards, and in part to, the high latitudes of its own hemisphere, until, by cooling, its substance becomes less buoyant, and sinks down gradually in various latitudes of that hemisphere, and forms itself into a return current towards the equator, in the lower part of the atmosphere.

"That the air of this great cap of atmosphere, covering the middle and higher latitudes, and including portions of the currents just described, having come from equatorial regions, which were moving absolutely from west to east in the earth's diurnal rotation with a velocity of about 1000 miles per hour, must, on coming into those new regions much nearer to the earth's axis, have greater velocity from west to east than the earth below it in those new regions has. That in the central or polar part of this great revolving cap of air the barometric pressure must be abated in consequence of the centrifugal tendency due to the extra speed of this great

whirling cap of atmosphere. That the bottom layers of this great cap of atmosphere, being by friction on the earth's surface retarded as to this extra velocity of rotation eastward, must have a diminished centrifugal tendency as compared with the quicker revolving air above them, and consequently tend to flow, and actually do flow, inwards, towards the region of abated barometric pressure at the centre of the revolving cap of air.

"That thus, over the middle, or middle and higher latitudes, there are three currents:—1. A top main current towards the pole. 2. A bottom subordinate current towards the pole. 3. A middle main current in direction from the pole, and constituting the joint return current for both the preceding currents.

"And that all these three have a prevailing motion from west to east in advance of the earth. That the great return current, flowing in direction from the pole towards the equator, arrives at a certain part of its course at which it ceases to revolve eastward in advance of the earth, and for the rest of its course to the foot of the equatorial rising belt it blows along the surface of the earth as the trade-wind of the hemisphere in which it is situated."

The Creux de Souci.—In company with MM. Delebecque and Gaupillat, M. E. A. Martel has investigated the remarkable pit of the Creux de Souci, in the department of Puy de Dôme, and contributes a notice of the work to the Académie des Sciences. The hollow occurs in a sheet of recent basalt on the south side of the Puy de Montchal, and according to local tradition an underground stream ran from the bottom of it to the neighbouring Lake Pavin. The crater-like opening is 82 feet in diameter and 38 feet deep, but at that depth a hole about 10 feet wide communicates with a hollow 70 feet deep, with a stagnant pool at the bottom, over which an accumulation of carbonic acid made it impossible for the explorers to reach the water surface. The interior was a vast vaulted hollow, apparently formed in the basalt when semi-fluid, by an explosion of volcanic gas. The most curious feature was the temperature (see 'Proceedings,' 1892, p. 467), which was 51° F. in the open air, 43° at a depth of 8 feet, 36° from 13 feet to 46 feet, and 34° near the water, the surface of which was 34°·3. This low temperature is attributed to the flowing in of ice-cold air in winter, and the entire absence of circulation during the rest of the year.

The Deep Lakes of France.—The Government surveys of France, like those of the United Kingdom, leave the beds of lakes as a blank on the map, thus failing to delineate the true configuration of the earth's crust. For some time M. Delebecque, and others associated with him, have been employed in a systematic survey of the chief French lakes. Omitting the Lake of Geneva, which has been thoroughly surveyed by the Swiss Government, the deepest of the fresh-water basins of France was found to be Lake Bourget, which drains into the Rhone. It has a maximum depth of 476 feet (79½ fathoms), and its surface is 758 feet above sea-level. Next in depth come the Lake of Issarles, in Ardèche, which is 358 feet (54½ fathoms), and Lake Pavin, in

the Puy de Dôme, with 302 feet (50½ fathoms). In the course of the various surveys a number of interesting temperature observations have been made, which throw light on the *regime* of the waters. Most interesting in this respect was the discovery made by thermometer soundings under the ice of the Lake of Annecy when frozen—that a large spring of warm water supplied the lake from beneath. The influence of wind in modifying the distribution of temperature was also marked in several instances, it being observed (as by Dr. John Murray, in Loch Ness) that long narrow lakes traversed from end to end by prevailing winds were much warmer in summer at some distance beneath the surface than similar lakes which presented their narrowest dimensions to the prevailing winds. The results of the soundings have been communicated from time to time to the Académie des Sciences, and are published in the 'Comptes Rendus,' cxi., p. 1000; cxii., p. 67, 896; cxiv., p. 32, 1504; cxv., p. 72.

Mr. Conway's Expedition to the Himalayas.—The following private letter has been received by Mr. D. W. Freshfield from Mr. Conway, dated Gilgit, June 8:—"The weather has been dreadful; daily snow, and such vast avalanches! The peaks here are difficult in their lower parts; the region above 17,000 feet is easy, but in this bad weather one is cut off from the upper region by the next 7000 feet below. There are numerous and vast glaciers descending to 8-9000 feet above sea-level. The characteristic of the scenery is huge overhanging glaciers above, and great icefalls below. I have devoted the best part of a month to the Bagrot Valley, and made a map of its glaciers on a scale of an inch to the mile. I have a number of theodolite observations as yet unreduced, which will enable me to make it much more accurate when I return home; at present it is plane-table work. Constant clouds have made surveying and mountaineering difficult. We climbed one 15,000-foot peak (about as hard as the Gabelhorn), and one of 17,000 feet. We made a desperate assault on a 23,000-footer, but were driven down from our high camp (15,600 feet), beyond which there was no climbing difficulty whatever, by a terrible storm, which lasted a week! Avalanches of huge size fell close to us. One brought down four ibex; another nearly took off two Goorkhas who had gone to look for the dead ibex. A dust avalanche enveloped us all, but did no harm. I am sending you my preliminary map; it will go down in the Residency bag. We cannot waste more time on Rakaposhi from the S. I sent the men off this morning; they are all working admirably. The heat down here is what you please. Even up above one has to climb in a turban. I have got materials for a geological map thus far, and have measured innumerable strikes and dips. I am taking constant observations of all sorts and kinds. The flower collection advances apace, and I have a good lot of seeds. MacCormick has made many sketches, and we have plenty of photographs."

Lieutenant Mizon's Journey from the Niger to the Congo.—Lieutenant Mizon, whose journey (‘Proceedings’ for June, p. 412), has evoked great interest in France, met with an enthusiastic reception on his return to Paris in June; and some details of his work have now been published. He left France in September, 1890, and a month later entered the Forcados River, at the west of the Niger delta. The party were provided with a steam launch—the *René Caillé*—and five canvas boats. After passing the trading post of Wari the expedition was attacked by the Patania—a tribe of river pirates—and Lieutenant Mizon and several others were severely wounded. One of the Royal Niger Company's steamers came to the rescue, and conveyed the wounded to Akassa, on the main stream of the Niger. Resuming the journey in December, the members of the expedition suffered from fever, and all Mizon's French subordinates either died or were invalided home; but after many delays he entered the Binuú, reached Ibi on July 23rd, and Yola in August, where the Sultan of Adamawa treated him well. An attempt to ascend the Kebbi was unsuccessful on account of low water in the river, and other difficulties; and the upper reaches of the Binuú proper were equally inaccessible. Leaving Yola finally on December 15th, 1891, Mizon came to Ngaundéré—a large fortified town of about 20,000 inhabitants—and thence the way led south-eastward across a series of rich grain-sown plateaus, where the temperature sometimes fell to the freezing-point. This plateau contains the watershed; and a series of streams flowing southward to the Kadei were encountered and followed past Yambala to the main river, at the junction of which with the Mombere Mizon met De Brazza. The most important geographical result of the journey is that it probably involves re-drawing the river system of southern Adamawa, the drainage of which apparently belongs mainly to the Sangha of the Congo basin, and not to the Sangha of the Cameroons.

Nyasaland.—Letters recently received from Nyasaland state that matters had now quite settled down again in the Shire Highlands. The new Sikh officer, Captain Johnson, had arrived, and taken command of Fort Johnston. Captain Selater was at work again on the road between Blantyre and Katunga, the present track being useless for carts because of the steep inclines. When this section was finished the road from Blantyre to Zomba (where the British Residency is) would be taken in hand, and then the direct road from Zomba to Zoa, and so to Chiromo. Captain Selater writes from Blantyre (May 29th): “To-day we have been up to the top of Zomba. It is a very extraordinary feature of this country that nearly all the mountains are simply huge tables, with precipices all round. Zomba is one of these, also Milanji and others; very few really rise to peaks. On the top of Zomba we found the climate and flora like those of the Cape. The general plateau

is from 4000 feet to 5000 feet above the sea-level; it is covered with short grass and clumps of trees, similar to Milanji; the difference is that there are no cedars,* and much less forest; the soil also is better. There is one fine large valley (that of the stream running down by the Residency), which was formerly thickly populated; but some thirty years ago all the people were sold and made slaves of by the invading Yaon, so that it is now uninhabited."

The Climate of Banana.—Dr. Etienne, of the Congo Free State, gives an account of the climate of Banana (lat. $6^{\circ} 0' 25''$ S., long. $13^{\circ} 30' 10''$ E.) in the March-April 'Bulletin' of the Royal Belgian Society of Geography. The full observations are given in a bulky paper published by the Government of the Congo Free State. Observations were made from December, 1889, onwards. The mean height of the barometer for eighteen months was 29.950 inches; the daily maxima occurred at 9 a.m. and 10 p.m., and the daily afternoon minima at 4 p.m., the average daily range being 0.1 inch. The annual range showed two maxima, the greater in July, the less in December, and two minima, the more important in February, the other in November. The annual mean temperature was 78° F., the hottest month being April (82°), and the coolest July (71°). On 138 days in the year the temperature was higher than 86° ; on 73 days it was lower than 68° . The cooler season may be said to last from June to October. The mean relative humidity in 1890 was 78.2 per cent.; the maximum being observed in September and May, the minimum in October and June. No fogs were observed. The daily wind changes were very regular. A light land breeze from S.E. to S. died away after sunrise, and was succeeded by a calm until about 11 a.m., when the sea breeze set in from S.W., and continued until 7 p.m.; finally, after a second calm, the land breeze recommenced about 10 p.m. As the sea breeze sets in in the forenoon, the rising thermometer is checked; and thus the maximum temperature occurs early in the day. In 90 per cent. of the cases during the last four months of the year the wind blew from some point between west and south. The rainfall is practically confined to the warm months October to May; the cooler season, from May to October, being rainless. A short relatively dry season in January or February divides the rainy season into two parts. The rainy season of 1889-90 had 50 days on which rain fell; and the total fall was 24.4 inches. In 1890-91 there were 29 days with rain, and the total reached only 15 inches, December and January being absolutely dry.

Exploration in the Sahara.—M. Fourean, who has been charged by the French Minister of Public Instruction with an important mission of exploration in the Sahara, has returned to Paris, having completed the first part of his journey, in the course of which he has penetrated further south than any European since the two missions of Colonel Flatters. A preliminary account of his journey has been communicated by him to the Geographical Society of Paris. Starting from Biskra in January last, M. Fourean's first objective was Mirila-Maâtalla, which he reached by a direct southerly route through the Erg, a little to the east of that taken by Captain Bernard, of the first Flatters' mission. Turning obliquely to the east, he made his way round the southern ridge of the Erg; and then traversing the rocky plateau of the Tinghert on the east, and the mountains which dominate

* The so-called "cedar" of Milanji is a conifer of the genus *Widdringtonia*, probably of a new species.

Temassinin on the north, and which, by three successive terraces of white and red cliffs, descend abruptly to the depression of "El Jun," he arrived at Temassinin. His route then lay south-west to the walls of Hassi-Tin-Sig, across the immense plain of the level reg which was once the bed of the Wed Igharghar. Turning to the north, and proceeding over a wrinkled hamada, the traveller reached El-Biodh, where he found the young palm trees, planted by Colonel Flatters on his first visit, flourishing well. Messagguem, to the west, was the last point visited; along the route the various promontories of the Erg were surveyed. The return journey to Tuggurt was effected in a direct line from south to north across the Erg by the "Fej-ulad-Mokran." M. Foureau has determined numerous altitudes, and the latitudes and longitudes of forty-one different points. Another party, consisting of M. G. Mury, as leader, and MM. E. Blanc, Fock, and Vicomte E. de Marsay, has returned from a geographical and commercial mission to the south of Wargla, and among the Azjer Tuaregs. They started on February 15th from El Wed (Sud) with a few natives, and, passing to the east of Uargla, advanced through the Igharghar and Adu-Taiba to El-Biodh, and then penetrated to Tabaibet, south of Temassinin. On March 6th they reached $27^{\circ} 41'$, having journeyed 450 miles from El Wed. At this point they were forced to turn back, owing to the ill-will of their guide.

Origin of the Great American Lakes.—The long researches of Dr. J. W. Spencer on the origin of the great lakes are tersely summarised with a sketch map in 'Science' xix. (1892), 312. The discovery of glacial striae, always oblique, or even at right angles to the rocky walls, disproved the older theory of glacial erosion. Now it is believed that the lake basins are simply valleys of erosion formed when the North American continent was 3000 feet above its present elevation. During the Ice Age these valleys were turned into lake-basins, partly by more or less complete obstruction, partly by subsidence of the region, but mainly by a re-elevation of the land, which was more rapid in the north-east, and led to the formation of rock barriers across the old valleys. Distinct traces of the ancient river-bed have been found largely obliterated by drift on the shores of the lakes. The old Laurentian River would seem to have flowed from Lake Michigan, along the axis of the Huron Basin, winding north into Georgian Bay, where the deep channel now runs close to the north shore of the Indian Peninsula. Thence the old drift-covered channel has been traced by borings across the isthmus to Lake Ontario, near Toronto, and along the south side of that lake to its outlet. Tributary buried valleys have been traced from Lake Michigan, through Saguenaw Bay (the Huronian River), and through Lake Erie (the Erian River). The warping which interposed a barrier of rock between Lake Ontario and the sea is clearly proved by the distortion of the old raised beaches, which no longer preserve a horizontal position, but dip from two to four feet in a mile.

Elements of the United States Population.—Census Bulletin No. 194, which has just been issued, arranges the population of the United States according to colour, sex, and general nativity, as shown by the census of 1890. In the total population of 62,622,250, the coloured amounted to

7,638,360, or 12·20 per cent. The term "coloured" includes "persons of African descent, Chinese, Japanese, and civilised Indians." The coloured population was smaller in 1890 than in any previous census year since 1850, when the percentage was 15·69; and except for the notoriously erroneous returns of 1870, the decrease appears to have been quite regular. The percentage of coloured persons in the population was least in the North Atlantic States (1·61), and lowest of all in New Hampshire, Maine, and Vermont; whilst it was greatest in the South Atlantic States (36·87), and absolutely greatest in South Carolina (59·87 per cent., or three coloured to two white), although Mississippi with 57·75 per cent. is scarcely behind. The rate of increase of the coloured population is practically only half that of the white—13·11 per cent. against 26·68—and only half of what it was in the decade 1840–1850. Classified according to sex, there were 32,067,880 males and 30,554,370 females in the United States, the relative percentages being 51·21 and 48·79. This shows a greater disparity than has existed since 1850; a fact accounted for by the recent increase of immigration, and by over three-fifths of the immigrants being males. The native-born in 1890 amounted to 85·23 per cent., while in 1850 the percentage was 90·32. This fact is of great significance, showing that the people of the United States, as a whole, are not becoming more homogeneous.

The Yukon District.—Newspapers, and particularly American newspapers, have many times furthered geographical exploration, and called out the latent talent of born explorers. The latest instance of newspaper enterprise in a little-known region is the expedition sent out last year under the experienced Alaskan traveller, Mr. Frederick Schwatka, to fill up some of the blanks in the map of Alaska. He was accompanied by Mr. Charles Willard Hayes, of the United States Geological Survey, who communicated an ably-written account of the journey to the 'National Geographic Magazine,' published May 15th. The main object is to summarise the scientific results; but an outline of the journey is also given which deserves to be placed on record until the full report of the expedition appears. The expedition of three white men and seven Indians left Juneau on May 25th, 1891, in two canoes up the Taku River; and a week later it reached the head of canoe navigation, after a voyage of 80 miles. The next 85 miles, to the head of Lake Aklen (formerly Lake Teslin), was accomplished on foot, at first through the Taku cañon, then, crossing into Canadian territory, through wide valleys at elevations rising to 5000 feet, and, finally, in the densely-wooded lake-strewn Aklen Valley. Dismissing the Indians, the three voyagers embarked in two canvas canoes, sailed down Lake Aklen and the Teslin River, which flows from it to the Lewes, and reached Selkirk, at the junction of the Lewes and the Pelly (formerly called the

Macmillan), on June 28th. After some delay a party was made up, including an additional white man—a gold prospector—eight Indians, and eleven dogs carrying loads, and marched south-westward across the great plateau stretching from the Yukon to Mount St. Elias, crossing the upper tributaries of the White River. In one case—the Klutlan—the only mode of crossing was to ascend the stream to its parent glacier. Here the party was reduced to the original three, who crossed the watershed on ice, and struck the Nizzenah, a tributary of the Chitlenah, and in a hurriedly-built boat descended it to Taral, at its junction with the Copper River, on August 12th, with only three pounds of flour and a handful of tea remaining. Thence after some tiresome delays they reached the coast at Eyak, and took steamer for Sitka. Mr. Hayes gives a general description of the Upper Yukon from the reports of Dr. George Dawson and other explorers as well as from his own observations. The orography of the district is not yet absolutely determined; but the St. Elias Range appears to have been produced by a separate and more recent uplift than the Coast Range, which trends inland towards the north. On the east of the Coast Range there is a well-marked plateau, which was crossed at an elevation of 5000 feet in passing from the Taku to Lake Aklen. The river valleys lie from 2000 to 2500 feet below the general level of the plateau; while broad dome-like elevations and a few sharp peaks rise from 700 to 1200 feet above it. The surface is consequently very rough and irregular, but it shows no well-defined ridges or chains of peaks. There is very little soil, but the thick covering of moss absorbs the scanty rainfall, and instead of being arid, the ground remains swampy. This effect, due to imperfect and slow drainage, materially modifies the scenery, which exhibits none of the steep bare slopes and barren ravines usually associated with slight rainfall.

Railways to Bolivia.—In a recent report Mr. Robilliard, the British Vice-Consul at Mollendo, discusses the problem of the transport of goods to and from Bolivia by rail. Mountain railways already reach the great plateau of the Andes from the Peruvian port of Mollendo, terminating at Puna, on Lake Titicaca, and from the Chilean port of Antofagasta towards Oruro. The latter line was constructed as far as Huanchaca to afford an outlet for silver ore and tin to the coast, and as the gauge is only two feet six inches, very frequent trains are required to take down the freight. Hitherto the up-trains have been run practically empty. The railway would now be open to Oruro but for the delay caused by the Chilean War last year. In order to reduce the expense of working a railway with empty trains in one direction, the policy of the company is to push on the lines to Potosi and La Paz, and so make Antofagasta the port of entry for Bolivian imports. More than half the trade of Bolivia now passes through Oruro, and it is greatly to the interest of Peru to afford a channel for it to one of their ports. This, Mr. Robilliard points out, could be done by canalising the Desaguadero River, and thus rendering it navigable up to Lake Titicaca. A line from La Paz to the lake has long been talked of, and, if completed, would probably prevent the proposed extension of the Chilean lines. The report advises that the railway terminus on the coast be

moved from Mollendo to Islay, where a better harbour can be made. The improvement of the steamers on Lake Titicaca, and the navigation of the Desaguadero have become necessary factors in the continued prosperity of the southern seaports of Peru.

Earthquakes in New Zealand.—Mr. George Hogben, Secretary of the Seismological Committee of the Australasian Association for the Advancement of Science, is endeavouring to establish a system of earthquake records throughout New Zealand. Between 1848 and 1890 Mr. Hogben has found records of 775 distinct shocks, not including the 70 or 80 shocks which accompanied the Tarawera eruption. The centre of greatest frequency lies in or near Cook Strait, the extreme north and south of both islands being little disturbed, or containing only centres of local earthquakes, which are felt at no great distance from the origin. The use of seismographs would greatly extend the utility of the investigation, both in determining the frequency and the intensity of shocks. Although undoubtedly very numerous, New Zealand earthquakes are usually slight—not more than three of all those recorded being entitled to the term severe.

Obituary.

Demetrius Rudolph Peacock, Her Majesty's Consul-General for the Governments of Volhynia, Podolia, Bessarabia, Kherson, Taurida, Kharkof, Poltava, Kief, Kurak, and Ubernigof, died, aged 53, at Odessa, after a short illness, in May last. He had been in ill-health for some time previously, his constitution having been shattered by the malarious fever of Batum, his previous post.

Having been educated in Russia, and studied law at Moscow, Peacock was especially fitted for the positions he held as Consul-General in the South of Russia. He had recently been transferred to his last appointment, having previously been Consul for some years for the Trans-Caucasus.

In this position, and while residing at Batum, he made a name both as a most efficient civil servant and a kind friend and host. A very large number of travellers on their way East will remember the aid and kindness they met with from Mr. Peacock. Speaking Russian like a native, he was able to mix in Russian society on perfectly equal terms, and his knowledge of Russian law often served him well in the difficult questions which sometimes arose at Batum. He was on equally good terms with the official world of Tiflis and with the native nobles, and his name was a passport in itself throughout the country. Mr. Peacock entered the British Consular Service as Vice-Consul in 1881, previous to which he had been employed in the construction of the Poti-Tiflis Railway as a contractor.

Mr. Peacock was the author of several papers on the geography and ethnology of the Trans-Caucasus region, and a vocabulary of 'Five West Caucasian Languages.' He possessed a mass of knowledge of the old and passing conditions of this interesting region; and it is to be hoped that the report that he has left behind him a work on the Caucasus may prove to be correct. It will be to many a subject of regret that so valuable a life should have been sacrificed by the decision of the governments concerned that the residence of the British Consul in Caucasia should be at Batum rather than at Tiflis, the seat of government.

REPORT OF THE EVENING MEETINGS, SESSION 1891-2.

Thirtieth Meeting, July 4th, 1892.—The Right Hon. Sir M. E. GRANT DUFF, G.C.S.I., President, in the Chair.

ELECTIONS.—*Charles Fox Frederick Adam, Esq.; Richard Hughes Benister, Esq.; Captain George Croker Bayly; Percival Harcourt Bewicke, Esq.; Sir Henry Ernest Gascoyne Bulwer, G.C.M.G.; Colonel Henry E. Coleville (Grenadier Guards); Rev. Pierre Bernard de Lam; Louis Hirsch; Edward Knox, Esq.; St. George Littlehale, Esq.; Ernest Louis McLaughlan, Esq.; J. W. Paterson, Esq.; Sir James Poole, M.P.; Hugh C. Robertson, Esq.; F. Augustus Alfred Smith, Esq., M.D.; Rev. Walter Weston.*

The paper read was:—

"The Physical Geography and Resources of North-West British Guiana." By EVERARD F. IM THURN, Esq., C.M.G.

There was an exhibition of curios and photographs in the tea-room.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Paris.—May 6th, 1892: M. E. LEVASSEUR, of the Institute, in the Chair.—This was the first general meeting of the year, and was the occasion of the distribution of the medals and prizes for 1892. After the distribution, the result of the election of members of the Bureau for 1892-93 was announced as follows:—President, M. Antoine d'Abbadie, of the Institute; Vice-Presidents, Dr. Hamy and M. A. Grandidier; Scrutineers, MM. G. Capus and J. Vallot; Secretary, M. Leon Teisserenc de Bort. In conclusion, Lieutenant Vedel made a further communication with reference to the Polynesians.

— May 28th, 1892: M. Cheysson in the Chair.

Two communications, one by M. Vuilbot, on the Algerian "Shotts," and another by M. Fourern, on his exploration of the Sahara, were read. A letter was read from M. Marcel Monnier, giving news of Captain Binger's expedition in Central Africa. The communication was dated March 20th, 1892, from Ammoakonkro, capital of the country of Iudome. The party had been travelling for 18 days through the tropical forest, and expected to reach the edge of it in the course of 10 days, arriving at Banduku about Easter. It was intended to proceed from there to Kong.

POPULATION OF SUMATRA.

From some official statistics forwarded by Dr. Meyners d'Estrey, it appears that the population of Sumatra is as follows:—Europeans, 3,847; natives, 2,727,661; Chinese, 105,823; Arabs, 2,600; other Asiatic nationalities, 5,156; total, 2,940,027. These figures, except that of the Europeans, must be regarded as approximate.

In conclusion, M. François, zoologist, read a paper on the New Hebrides.

Geographical Society of Berlin.—June 11th, 1892: Baron von Richthofen in the Chair.

ASCENT OF THE PEAK OF DEMAVEND.

After the reading of the business communications, the Swedish traveller, M. Sven Hedin, gave an account of the ascent of Demavend, which he made in the course of a journey into the Elburz Mountains in the summer of 1890, undertaken at the instance of the Shah. The first European who climbed the summit of Demavend was Sir Taylor Thomson, in the year 1837; among others who have since ascended the peak is Brugsch Pasha. The volcano, which towers up to a height of 8,550 feet from the sedimentary rocks of the adjoining parallel chains, consisting of lias and jurassic lime and sandstones, has not in the slightest degree altered the position of these rocks. No eruption has taken place within historical time. It is, however, very difficult to determine whether the volcano is to be regarded as extinct or active; probably it is a kind of solfatare. The ascent was made on the 10th and 11th July, 1890, from the village of Hachak, on the south-eastern slope of the mountain. Accompanied by two guides, M. Hedin started at 4 p.m., and about 8 p.m. reached a height of 10,500 feet, where the first snow was seen. The night was passed here out in the open. At 4.30 on the morning of the 11th the ascent was continued, the way leading up the southern slope, and between boulders of granite and volcanic rocks. On attaining an altitude of 11,550 feet, the traveller experienced the first symptoms of mountain sickness—viz., severe headache, nausea, giddiness, and palpitation of the heart. The ascent became increasingly arduous. Enormous black masses of rock projected from the side of the mountain. Hour after hour passed, the character of the ground did not change, and the summit still appeared to be out of reach. During the last three hours of the ascent a heavy shower of hail fell. The top was gained at last about 4.30 p.m. Here the traveller observed a crater of elliptical form about 1500 yards across, on the edge of which were large blocks of porphyry and sulphur, and the air was full of the smell of sulphur. The thermometer fell to 29° (Fahr.); the altitude was determined at 17,930 feet. Although the ascent had occupied 12 hours from the starting-point of the morning, the descent was accomplished in one hour, as the traveller glissaded down a snow channel with wonderful rapidity.

Dr. Georg Wagner then read a paper upon the geographical results of the expedition of M. Bonvalot and Prince Henry of Orleans through Central Asia in 1889-90.

NEW GEOGRAPHICAL PUBLICATIONS.

(By HUGH ROBERT MILL, D.Sc., *Librarian, R.G.S.*)

EUROPE.

[*Alpine Journal.*]—Index to the *Alpine Journal*. Vols. I. to XV., including "Peaks, Passes, and Glaciers," edited by F. A. Wallroth. London, Longmans, Green & Co., 1892: 8vo, pp. viii. and 111. Price 2s. 6d.

This useful and welcome index is classified under four heads:—1. The names of authors; 2. Maps and illustrations; 3. A special index for each of twenty-four districts in the Alps, and for several other mountain groups; 4. A general index. The special indices are particularly valuable, and may be considered as a full catalogue of mountaineering for the last thirty years.

Bartoli, M. E., and Ramón, L. P. de.—España y sus Colonias. Noticia de su población, agricultura, industria y comercio según los más recientes datos estadísticos y Estado Actual de su organización administrativa, militar, marítima, judicial, eclesiástica y universitaria, con arreglo á los últimos datos oficiales. Barcelona, 1891: 4to, pp. 277.

Corti, Siro.—Le Province d'Italia sotto l'aspetto geografico e storico, Nos. 47-51. Roma, G. B. Paravia e comp., 1891-92.

This cheap and prettily illustrated series contains a volume devoted to each province of the kingdom of Italy, with a map showing the minor political subdivisions.

No. 47. Province of Genoa, pp. 104. Price 1 lira. No. 48. Province of Porto Maurizio, pp. 55. No. 49. Province of Venetia, pp. 70. No. 50. Province of Verona, pp. 63. No. 51. Province of Vicenza, pp. 57. Price 50 centesimi each.

Friederichsen, L.—Die deutschen Seehafen. Zweiter Theil. Hamburg, L. Friederichsen & Co., 1891: 4to, pp. xiv. and 346.

The First Part of this work was published in 1889 (see 'Proceedings' 1890, p. 433). It is intended as a handbook for ship-captains, ship-owners, insurance agents, ship-brokers, and the like. The present Part treats of the harbours and landing-places on the German North Sea coast. There are five maps, and several plans of important harbours.

Goodman, E. J.—The Best Tour in Norway. London, Sampson Low, Marston, & Co., 1892: 8vo, pp. 336, with maps and illustrations. Price 7s. 6d.

This book is not so ambitious as its title; it is written in an easy narrative style, rather superficial in parts, but as the author expressly says, it is not an "instructive" volume. Mr. Goodman's "best tour" was made in 1890, from Stavanger, through Brattanddal to the Hardanger, thence by Vossevangen, the Sogne Fjord, and the Romsdal to Molde, whence the return journey was by sea to Bergen. Some very fine photographs by Messrs. Valentine and Sons, Dundee, form one of the best features.

Graf [Dr.], J. H.—Bibliographie Nationale Suisse. Géodésie et Cartes de la Suisse, des Régions et Cantons. Berne, K. J. Wyss, 1892: pp. xvii. and 193.

Section II. of the plan of a national bibliography of Switzerland comprises a catalogue of all maps, catalogues of maps, and photographs of the country. This fills three fascicles, of which the first has now been issued. It commences with a bibliography of Swiss geodesy founded on Wolf's history of geodetic operations and with the co-operation of the Topographical Bureau of the Federal Government. It includes a list of the maps of Switzerland, of parts of the country, and of special cantons, and is completed by an alphabetic index.

Janko [Dr.], János.—Kalotaszeg Magyar Népe. Néprajzi Tanulmány. Budapest, 1892: 8vo, pp. vii. and 223, map and plates. [Presented by the Author.]

An ethnological treatise on the natives of Hungary.

Keary, C. F.—Norway and the Norwegians. London, Percival & Co., 1892: 8vo, pp. 407. With maps and illustrations. Price 5s.

Mr. Keary has written something of more value than a mere guide-book for those tourists who visit Norway simply to "do" the country. His aim has been to give the visitor to Norway an intelligent interest in the country, by supplying some "links of the Norway of to-day to the Norway of the past." The author naturally begins with the geographical features of the country; but he is in error in supposing that fjords are peculiar to Norway. The sea-lochs of the west of Scotland are true fjords, though on a smaller scale, and are in

no sense estuaries. Greenland, Labrador, the extreme south of South America, and the south island of New Zealand are all characterised by similar sea-inlets, similarly related to the past glaciation of the country.

Six chapters are devoted to a history of the country, several to its mythology, literature, and present condition, while a special chapter is added on the distribution of the wild flowers, and the interesting questions to which this subject gives rise. There are maps of historic Norway, and of Scandinavian settlements in northern Europe in the tenth and eleventh centuries.

Mill [Dr.], H. R.—The Clyde Sea Area, being (No. 23) Part III. of the Transactions of the Royal Society of Edinburgh, vol. xxxvi. Edinburgh, R. Grant & Son; London, Williams & Norgate, 1892: large 4to, pp. 90. Twelve maps and plates. Price 12s. 6d. [Presented by the Author.]

Parts I. and II. of the full discussion of the researches of the Scottish Marine Station on the physical conditions of the Clyde Sea Area, dealing with the physical geography of the region and the salinity of the water, are here published. The region studied is the 1160 square miles of water surface lying within a line drawn from the Mull of Cantyre to the Binn of Galloway, opening to the Atlantic Ocean and the Irish Sea, and receiving the drainage of 1350 square miles of land. The average depth of the water in the area is 29 fathoms, and its volume 25.5 cubic sea-miles at low water, which is increased by 1.15 cubic sea-miles at high tide. The Sea Area is divided from the open sea by a barrier plateau rising to about 20 fathoms from the surface. Within it there are various deep channels separated from the deep basins of the sea-lochs by bars or shallows. The various more or less isolated bodies of water form natural divisions of the Area, which are adopted for the purpose of grouping observations in preference to the arbitrary division into "firth" and "lochs," which results from considerations of the surface only. The exact configuration of each natural division and its volume have been calculated from the Adam's charts, and are detailed in the paper with diagrammatic sections. The rainfall over the whole area for the average of eighteen years, and for the period over which observations extended, is discussed, the minimum being found to occur in May, the maximum in January. The methods employed for collecting and determining the density of water-samples are described, together with the manner of working on the steam yacht *Mohua*, all the density observations being printed *in extenso* as an appendix. The greater part of the paper is a discussion of the seasonal variations of salinity during 1896-87-88 with respect to the actual rainfall, and to the special physical conditions of each channel or basin. The proportion of sea-water and land-water present at the time of each monthly trip was calculated, and an endeavour made to trace the connection between the amount of the rainfall and the salinity, thus eventually arriving at the normal salinity of the Area in a period of normal rainfall from the data of actual change of salinity observed with the actual change in amount of rain. The attempt to apply this method was only partially successful on account of the disturbing action of wind. With a gale blowing right down Loch Pyne, for example, it was found that the water at the head of the inlet was actually saltier on the surface than that 30 miles nearer the sea, the fresher surface water being driven seaward, while the saltier deep water rose from below to take its place. Thus, although the sea-lochs penetrate for many miles into a mountainous region where the rainfall exceeds 60 inches per annum, their water is not freshened to a great extent, and they remain filled with sea-water only slightly diluted. In winter it frequently happens that a surface layer of fresh water flowing from the hills floats and freezes on the surface of the warmer salt water. The discussion of the very numerous temperature observations which have been made is not yet completed, but it is expected that it will make it possible to give a full account of the relation of configuration to tide and climatic changes in affecting the circulation of shore-waters. The present paper is illustrated by a key-map showing the divisions of the Area, a bathy-hypsenetrical map of the Clyde basin, a map of average

and one of actual rainfall, maps showing the average salinity at surface and bottom of the water, and six coloured plates of diagrams.

[**Murray's Handbooks.**] Handbook for Travellers in Norway. Eighth edition. London, John Murray, 1872: post 8vo, pp. [108], and 187, maps and plans. Price 7s. 6d.

The present edition of the 'Handbook to Norway' has, it is stated, been almost entirely rewritten and reconstructed, and the information is apparently brought up to date. In the Introduction sections will be found dealing, among other things, with history, government, geography, geology, climate, statistics, language, sport, season for travel, &c. Several new maps have been added to this edition, and are much clearer than the old.

Norwegian North-Atlantic Expedition.—1876-1878. XXI.—Zoology. Crinoids. By D. C. Danielssen. With 5 plates and 1 map. Echinoids. By the same. With one plate. Christiania, Grøndahl & Søn, 1892: 4to. [Presented by the Editorial Committee of the Norwegian North-Atlantic Expedition.]

Regel [Dr.], Fritz.—Der Thüringer Wald und seine Forstwirtschaft. Deutsche Geographische Blätter, xv. (1892), 1-40, 106-140.

Complete account of the forests of the Thuringer Wald, with a map showing their distribution and ownership.

Traeger [Dr.], Eugen.—Die Halligen der Nordsee. Stuttgart, J. Engelhorn, 1892: 8vo, pp. 119. Price 1m. 50. Three maps and nineteen illustrations.

A delightful little monograph, forming the third part of the sixth volume of Kirchhoff's 'Forschungen zur Deutschen Landes- und Volkskunde.' The Halligen are a group of islands off the coast of Schleswig-Holstein, little known even in Germany. They are composed for the most part of sand-dunes rising from low sandy meadows intersected by sea-water channels, and merging into wide tracts of sand, covered at high tide. The configuration of the islets is subject to constant change from the action of wind and water; in some parts the houses have to be protected by dykes. The people are of the Frisian race, still speaking their original language, which is so much more akin to English than to German that the natives can converse more readily with the English fishermen, who occasionally visit them, than with their German compatriots.

ASIA.

Batchelor [Rev.], John.—The Ainu of Japan. London, The Religious Tract Society, 1892: 8vo, pp. 326. Illustrations. Price 6s. [Presented by the Publishers.]

Many mistaken ideas regarding the Ainu are corrected by Mr. Batchelor's careful study of their character and customs. The name Ainu—meaning man—they use to designate themselves. Aino, hitherto the name usually adopted in Europe, is a contemptuous Japanese term. The author's intimate acquaintance with the people and their language have enabled him to elicit a surprising amount of information regarding the religion, the forms of worship, and the complicated social etiquette which govern these primitive people. Some interesting mythological tales are also put on record. Although lazy, and slow in thought, the Ainu, despite their primitive condition, held several remarkably correct views on cosmogony—the successive rising and setting of the sun convinced them that the earth must be round and not flat. The value of this book to ethnologists is very great, and it may be classed as one of the most important contributions to the literature of the Ainu, its importance being enhanced by the circumstance that Mr. Batchelor confines himself to facts of his own observation, and enters into no speculations.

Cholet, Comte de.—*Arménie, Kurdistan et Mésopotamie.* Paris, E. Plon, Nourrit et Cie., 1892: 8vo, pp. 394. Price 4 fr. Map and illustrations.

Lieutenant de Cholet, with a fellow officer and an escort provided by the Turkish authorities, travelled in winter from the railway terminus at Ismidt to Angora, thence through Erzerum to Bitlis, on Lake Van, reached the Tigris at Diarbekir, and descended that river in a kelek, or skinsraft, on which a little cabin was built, to Bagdad. The return journey was up the Euphrates valley, through Aleppo, and by sea from Alexandretta. Adventures of the usual sort were not lacking, and the fellow-countrymen whom the travellers met acquainted them with more startling adventures, which are duly recorded as happening to someone else. The estimate of Turkish rule is unfavourable, but people as well as rulers were found to be woefully demoralised. Armenians, Kurds, and Arabs left similar impressions; all seemed to M. de Cholet unfit for self-government, and untrustworthy in their conduct.

Cuinet, Vital.—*La Turquie d'Asie, Géographie administrative, statistique, descriptive et raisonnée de chaque province de l'Asie-mineure.* Tome deuxième. Paris, Ernest Leroux, 1891: large 8vo, pp. 474.

The first volume of this laborious work is noticed in the 'Proceedings' for 1891 (XIII., p. 739). Vol. II. contains statistics and maps of the vilayets of Adana, Aleppo, the mutasarrifate of Zor, the vilayets of Mamourat-ul-Aziz and Diarbekir. It forms a valuable gazetteer of Asiatic Turkey, but can hardly be viewed as a geographical treatise on account of its failure to correlate conditions and races with actual circumstances.

Ferguson, A. M. & J.—*The Ceylon Mercantile and Planting Directory; with Planting Review, Calendar, Revenue and Trade Returns, and other useful information, for 1891-1892.* Colombo, A. M. & J. Ferguson: 8vo, pp. xxvii. and 712. [Presented by the Publishers.]

Hahn, C.—*Aus dem Kaukasus, Reisen und Studien. Beiträge zur Kenntnis des Landes.* Leipzig, Duncker & Humblot, 1892: 8vo, pp. 299.

Dr. Hahn, who is a resident at Tiflis, gives in this volume an account of his summer excursions in the Ossetian and Swanetan Mountains, and in the districts of the Chevours, Pshavs, and Tushetts. Those who are interested in the connection between the mountain tribes, their origin, and their present condition and customs, will find much interesting matter in these pages. Dr. Hahn had previously published, in Russian, at Tiflis, in 1884, a work on the traces of the Greeks and Romans in the Caucasus, and refers in this volume also to details of classical geography.—[D. W. F.]

Hassert [Dr.], Kurt.—*Der Scutari-See.* 'Globus,' lxxii. (1892), 9-14, 17-21, 57-59. Illustrated description, with a bathymetrical map of the Lake of Scutari.

Huber, Charles.—*Journal d'un Voyage en Arabie (1883-84).* Publié par la Société Asiatique et la Société de Géographie sous les auspices du Ministère de l'Instruction Publique. Paris, Imprimerie Nationale, 1891: large 8vo, pp. 780. Maps. Price 30s.

MM. E. Renan, Barbier de Meynard, and C. Maunoir edit, or rather publish, in this great volume, the contents of the note-books kept by M. Huber on his fatal journey through Arabia. The daily journal is much too detailed to be interesting reading, and it can only appeal to Arabic scholars, who will find an immense number of copies of inscriptions, and to those geographers who do not shrink from manipulating a mass of raw material for map-making. The chief value of the volume is for the orientalist; but one cannot help regretting that M. Huber had not had a photographic equipment with him, like to save himself the labour of much minute transcription, and to present to the students of his work a record free from uncertainty and ambiguity. During the years

1882-84, M. Huber travelled from Tadmor, through Damascus, the Syrian Desert, and across the Nefad to Hail, and thence by the pilgrim road (avesting Mecca, of course) to Jeddah. But from Hail he made a short journey eastward, and a long tour westward across the desert to Teluc and El-Ala. He constructed sketch maps of all his journeys, which are reproduced with his uncorrected aneroid readings changed arbitrarily into altitudes, but the 120 observations for latitude which he made had not been worked out before the journals were published, hence the tempting material for filling a very white part of the map of Arabia cannot be taken advantage of.

Seidmore, Eliza Ruhamah.—*Jinrikisha Days in Japan*. New York, Harper & Brothers, 1891: sm. 8vo, pp. x. and 386, illustrations. [Presented by the Authoress.]

An account of two visits to Japan, covering a period of nearly three years. Among the more important places described may be mentioned Yokohama, Tokio, Nikko, Kioto, Nara, Osaka, Kobe, and Arima. The volume contains some interesting notes on the minor phases of Japanese life.

Schlegel, Gustave.—*Fou sang Kouo, — Le pays de Fousang*. Leide, E. J. Brill, 1892: 8vo, pp. 68.

Fusang, according to the Chinese geographers, was situated on the east of China, on the east coast of the "eastern sea," on the "azure sea," south of Chaulsien (Northern Korea), and 1000 li to the west of the "Country of the Women" (Ni Kuo), which we believe to be the same as the "Bo-tin" or "No-men" islands. A Buddhist priest came from Fusang to China in 499 A.D., and said that the people wore stuffs and made paper from the bark of a tree, knew of writing, had prisons and a code of laws, that their king was styled "Iki," and their nobles of the first and second rank "Tui lu," that they had cows with long horns, that their marriage and funeral ceremonies were like those of China, that Buddhism had been introduced into the country in the year 458 A.D., that the people sent embassies to China about 502 A.D. and 520 A.D. with tribute of silk and a crystal mirror for looking at the sun, that their silkworms' eggs were very large, and that a Korean who was attached to the suite of an ambassador from Sura (South Korea) went by ship to Fusang, and was made Inspector of Manners and Customs there. Previous writers had put forward the theory that Fusang was America, and we are at one with M. Schlegel in thinking that that could not be the country intended from the accounts we have of it in Chinese books; but we cannot agree with his identification of Fusang with the island of Kratto, or Sagham, at the mouth of the Amur River. M. Schlegel points out that "Tui lu" is an ancient Korean word; but accounts for its being used by the Ainu of Kratto by saying—though he does not prove it—that the island must have been colonised from Korea. He admits also that there are no kings in Kratto, that no prisons can be found there, that the people do not make paper from the bark of a tree, and that they have lost the art of writing. Only a few of the difficulties are thus disposed of. In religion, raiment, and customs the Ainu of Kratto must have differed as much in former times as they do now from the people described as inhabiting Fusang. It seems much more likely that Fusang was the treaty port of Pusan, or Pusan, on the south-east coast of Korea. This place is half a day's sail from the island of Tsushima. Embassies from Japan made it a place of disembarkation. All the details referring to Fusang apply to this port, and there would be nothing extraordinary in the nobles of Fusang having Korean appellations.—[H. J. A.]

Schrenck, L. v.—*Reisen und Forschungen im Amur-Lande in den Jahren 1854-1856*. Band III., 2te. Lieferung. Die Völker des Amur Landes. Ethnographischer Theil, erste Hälfte. Mit Tafeln und Holzschnitten. St. Petersburg, 1891. 4to, pp. xix. and 311-630.

The author deals with the ethnology of the inhabitants of the Amur

countries, giving a description of the Gilyaks, Ainu, Oroks, Oltsha, Negda, Golde, and various other tribes. The volume is a detailed monograph of the mode of living, customs, industries, etc., of these tribes, and is well illustrated by a number of plates, some of them chromo-lithographs of great beauty.

West, Robert H.—Barometrical Determination of Heights in Lebanon, Anti-Lebanon, and on Hermon. Quarterly Statement of Palestine Exploration Fund, 1892: 218-226.

A list of 33 determinations by mercurial barometers, and 141 by means of aneroids.

AFRICA.

Etienne [Dr.], E.—Le Climat de Banana en 1890; suivi des observations météorologiques faites du Décembre 1er, 1889, au Mai 16, 1891. Publications de l'État Indépendant du Congo, No. 7. Bruxelles, 1892: large 8vo, pp. 236. [Presented by the Government of the Congo Free State.]

Hore, E. C.—Tanganyika: Eleven Years in Central Africa. London, E. Stanford, 1892: 8vo, pp. xii. and 306. Price 7s. 6d. [Presented by the Publishers.]

The geographical results of Captain Hore's journeys have already been published in the 'Proceedings' (1889, p. 581). The present volume gives a full and interesting account of his labours in Central Africa, showing the wonderful changes which have taken place in the African lake region during the last sixteen years, in consequence mainly of the efforts of English and Scottish missionaries.

Hughes [Rev.], W.—Dark Africa, and the Way Out; or, a Scheme for Civilising and Evangelising the Dark Continent. London, Sampson Low & Co., 1892: crown 8vo, pp. xiv. and 155, illustrations. Price 2s. [Presented by the Author.]

The author's scheme, as set forth in this volume, may be summed up in the words "Africa for the Africans." Mr. Hughes maintains that if Central Africa is to be civilised and evangelised it must be through the native himself. His method is to train a number of Africans in this country, both religiously and industrially, that they may afterwards return to their native land and enlighten their own countrymen. With this object the Congo Training Institute, situated at Colwyn Bay, North Wales, was founded, and it is with the history and progress of this institution that the volume mainly deals.

Knight-Bruce, G. W. H.—Journals of the Mashonaland Mission, 1888 to 1892. Edited, with an Introduction, by L. K. B. Published by the Society for the Propagation of the Gospel in Foreign Parts, 1892: 8vo, pp. viii. and 99. Maps and illustrations.

Contains the Journal of the Bishop of Mashonaland during his journeys in various parts of the country.

AMERICA.

Boyle, David.—Annual Archæological Report, Canadian Institute (Session 1891), Toronto, printed by order of the Legislative Assembly. 8vo, pp. 102. Illustrations. [Presented by the Canadian Institute.]

Campbell [Dr.], John.—Siberian Inscriptions. Transactions of the Canadian Institute, II. (1892): 261-283.

A criticism on Aspelin's interpretations of the rock writings of the Yenesei Valley.

Dall, William Healey.—Early Expeditions to the Region of Bering Sea and Strait. Being Appendix No. 19 to the Report for 1890 of the United States Coast and Geodetic Survey. Washington, 1891. [Presented by the Author.]

The detailed heading of this paper reads, "Notes on an original manuscript chart of Bering's Expedition of 1725-1730, and on an original manuscript chart of his second expedition, together with a summary of the Journal of the first expedition, kept by Peter Chaplin, and now first rendered into English from Bering's Russian version." The log of Bering's expedition is literally translated, and facsimiles of two original charts are given.

Dewey, Frederick P.—Bulletin of the United States National Museum, No. 42. A preliminary descriptive catalogue of the systematic collections in economic geology and metallurgy in the Museum. Washington, Smithsonian Institution, 1891: 8vo, pp. xviii. and 256. [Presented by the Smithsonian Institution.]

In the form of a catalogue of the systematic collections of specimens, this volume forms not only a descriptive handbook of metallurgical processes, but a key to the geographical distribution of useful minerals in the United States.

Dorsey, James Owen.—The Ogéha Language. Contributions to North American Ethnology, vol. vi. Washington, 1890: 4to, pp. xxiii. and 794. [Presented by the Bureau of Ethnology.]

This great volume is filled with the myths and stories of the Omaha and Ponka tribes of the Siouan linguistic family who speak the Ogéha language. There are also letters with literal and free translations. They are of great value as a collection of folk-lore, the compiler having lived amongst the Indians as a missionary, and subsequently secured the services of some of the educated Indians in the revision of the proofs.

Goode, G. Brown.—Bulletin of the National Museum of the United States, No. 41. Bibliographies of American Naturalists, V. The Published Writings of Dr. Charles Girard. Washington, Smithsonian Institution, 1891: 8vo, pp. 141. [Presented by the Smithsonian Institution.]

A valuable summary of 198 papers by Dr. Girard on various branches of natural history, mainly systematic studies of American species, frequently with reference to their geographical distribution.

King, Moses, and Sweetser, M. F.—King's Handbook of the United States. London, Osgood, McIlvaine, & Co. Small 4to, pp. 939, 51 maps, 2,639 illustrations. Price 10s. 6d.

After twenty-six pages devoted to a sketch of the United States as a whole, this remarkable volume contains a series of profusely-illustrated articles, arranged alphabetically, on each of the states and territories. Each article commences with a historical notice, a table of statistics, and list of ten largest towns, with census returns of 1890, and an account of the physical geography of the State. Then follow details of agriculture and industries, notes on railways, chief towns, government, and financial condition. Much curious and otherwise inaccessible information is here brought into a convenient form easy for reference.

Lucas, Frederick A.—Explorations in Newfoundland and Labrador, 1887. Annual Report of the Smithsonian Institution, 1889: pp. 709-728.

The discovery of the bones of the Great Auk was the main object of the expedition here described. Information regarding existing fauna and some geographical data are also given.

Mexico.—Codigo de Minería de la Republica Mexicana. Paris and Mexico, Ch. Bourcet, 1889: 16mo, pp. 156. [Presented by Francis Parry, Esq.]

A summary of the Mexican laws regarding mining.

Pilling, J. C.—Bibliography of the Algonquian Languages. Washington, Government Printing Office, 1891: 8vo, pp. x. and 611. [Presented by the Smithsonian Institution.]

This volume forms the fifth number of a series of bibliographies which are being published by the United States Bureau of Ethnology. It embraces 2,215 titular entries, of which 1,926 relate to printed books and articles, and 319 to manuscripts, and contains 82 facsimiles of title-pages of old books, &c., bearing on the subject. The Algonquian-speaking peoples covered a greater extent of country, perhaps, than those of any other of the linguistic stocks of North America, their habitat stretching from Labrador to the Rocky Mountains, and from the Churchill River of Hudson Bay to Pamlico Sound in North Carolina. The literature of their languages is stated to be by far the greatest in extent of any of the stocks north of Mexico, being equalled, if at all, by only one south of that line, namely, the Nahuatl.

Reid, Harry Fielding.—Studies of Muir Glacier, Alaska. National Geographic Magazine, Washington. March 21, 1892. Separately printed.

Mr. Reid, who, with four companions, spent, in 1890, some time in examining, mapping, and photographing the Muir glacier, on the Pacific coast between Sitka and Mount St. Elias, here gives, with many illustrations, a careful account of the results of his investigations.

The glacier, as far as it has been measured, is calculated to be 35 miles in length, to cover 350 square miles, and to move near its lower extremity at a rate, in the centre, of 7 feet a day in summer. The highest peaks in the vicinity average 6000 to 7000 feet. Mr. Reid's monograph is a model of intelligent topographical research.

In matters of glacier science he holds to generally discarded theories. For instance, he believes that "the best method of determining the amount of glacial erosion is to calculate the amount of sediment carried off by sub-glacial streams." This method obviously neglects the facts that this sediment represents in great part what falls on the ice through the action of sub-aerial denudation on the upper ledges, and that the sub-glacial streams themselves are constantly eroding the soft mud under the melting ice, which Mr. Reid proves to us the glaciers themselves are unable to move. This last fact tries his faith in what he has been taught rather severely, and he is reduced to somewhat poor shifts to explain it away.—[D. W. F.]

Remondino [Dr.], P. C.—The Mediterranean Shores of America. Southern California: its Climatic, Physical, and Meteorological Conditions. Philadelphia and London. The F. A. Davis Co., 1892: 8vo, pp. xiv and 160, illustrations.

In this volume the author deals largely with the climatological conditions of Southern California, of which he takes a very favourable view. Southern California, he states in his Preface, has six distinct classes of climates, all having a special therapeutic value. 1. A purely insular climate. 2. The peninsular climate. 3. The coast climate. 4. The foot-hill and valley climate, 200 to 2500 feet elevation. 5. The mountain climate, 2500 to 7000 feet elevation. 6. The desert climate, from 300 feet below sea-level to 2500 feet elevation. Of these it will be seen the three first are essentially marine climates, the fourth is partly marine in its effects and influence, and the fifth and sixth classes are land climates. The Introduction treats of meteorological conditions and disease; sea-air and marine climates; ocean-moisture and soil-moisture; extreme dryness of the air; consumption and temperature; geographical limits of consumption; the relative merits of altitude; sea and mountain climate on infant mortality; marine climate and adult life, &c. This is followed by a description of Southern California, its physical, meteorological, and climatological conditions, and Southern California health-resorts. Altogether the volume is above the average of local climatic guide-books.

Roberts, Charles G. D.—The Canadian Guide Book. The Tourist's and Sportsman's Guide to Eastern Canada and Newfoundland. Including full descriptions of routes, cities, points of interest, summer resorts, fishing places, etc., in Eastern Ontario, the Muskoka District, the St. Lawrence region, the Lake St. John country, the Maritime Provinces, Prince Edward Island, and Newfoundland. With an appendix giving fish and game laws, and official lists of trout and salmon rivers and their lessees. London, W. Heinemann, 1892: 12mo, pp. viii. and 270, maps, plans, and illustrations.

The scope of this work is sufficiently indicated by the above title. As is stated, it mainly deals with Eastern Canada. In arrangement and classification of the matter and method of treatment, it is based on Baedeker's Handbooks.

[**United States.**]—Annual Report of the Board of Regents of the Smithsonian Institution for 1890. Washington, 1891: pp. xlii. and 808. [Presented by the Smithsonian Institution.]

In addition to the usual formal report, there is an appendix of over 700 pages, containing a number of papers collected from various sources and representative of the advance of science—including geography—in the year 1890.

[**United States.**]—Report of the Chief of the Weather Bureau for 1891, by Mark W. Harrington. Washington, 1892. 8vo. Extracted from the Report of the Secretary of Agriculture for 1891. [Presented by the Weather Bureau.]

The meteorological work of the United States Government, which had been inaugurated and organised by the officers of the Signal Service, was transferred from the control of the Army to the Department of Agriculture on July 1st, 1891, and the report of the first half-year's work under the new auspices is now before us. The transfer has apparently quickened the activities of the Department, not only in weather-predicting, but in those less common observations which link meteorology to geography. The connection of meteorology with magnetic conditions has been investigated, and a careful study of soil physics is being carried out. The general climatology of North America is gradually being placed on a proper footing, and we may hope that the centred uniformity of observation and discussion over so wide an area will ultimately enable the barometer to be used with more certainty than has hitherto been the case in determining heights.

Verdia, L. P.—Compendio de la Historia de México desde sus primeros tiempos hasta la Caída del segundo Imperio. Segunda edición. París, G. Hermanos, 1892: crown 8vo, pp. xvi. and 102. [Presented by the Author.]

A history of Mexico, written for the use of the higher colleges of the Republic.

AUSTRALASIA.

Carrick, Ro.—New Zealand's Lone Lands. Being brief notes of a visit to the outlying islands of the Colony. Wellington, 1892: 8vo, pp. 71. [Presented by the New Zealand Government.]

Originally a Report for the Lands and Survey Department, this little book has been rearranged and expanded so as to be of general interest, and is published by the authority of the New Zealand Government. The Auckland Islands, Campbell Island, and the Antipodes Islands are described in some detail. It is mentioned that in crossing Auckland Island the compass is absolutely useless, bearings taken from the shore to a ship being from 44° to 175° in error through local attraction.

Hayter, H. H.—Victorian Year-Book for 1890-91. Vol. ii. Melbourne, 1892: 8vo, pp. 518. [Presented by the Author.]

Hogben, George.—Earthquakes in New Zealand. Separately printed, 1891. [Presented by the Author.]

Ross, Malcolm.—Aorangi; or, the Heart of the Southern Alps, New Zealand. Wellington, 1892: 8vo, pp. 64. Illustrations, and three maps. [Presented by the New Zealand Government.]

New Zealanders have become fully alive to the grand mountaineering ground of the Southern Alps, and within the last two years several notable ascents have been made by self-taught mountaineers. An Alpine Club has been formed, of which the author of this book is vice-president, and the Club has commenced to issue a 'New Zealand Alpine Journal.' Mr. Ross has undertaken the present work at the instigation of the New Zealand Government, with the view of acquainting tourists with the fine mountain and glacial scenery of South Island. An account of the Alpine districts is given, with particulars of the routes to and through them. A chapter is devoted to the description of an expedition to the Great Tasman glacier, another to glacier phenomena, and there is a good *résumé* of the work of early explorers, in the curiously limited range of "early" in New Zealand. A few notes on geology, botany, and zoology, and an appendix on survey work in the Southern Alps, complete the book.

Sherron, R. A. A., and Wallace, J. H.—Early History of New Zealand. Edited by Thomson W. Leys. Auckland, H. Brett, 1890. 4to, pp. 728, and xliii. Illustrations. Price 45s.

A handsomely-illustrated volume, detailing the history of New Zealand down to 1845, giving an authentic account of the Maoris as found by the first settlers.

Woodward, Harry Page.—Report on the Goldfields of the Kimberley District, Western Australia. Perth, 1891: 8vo, pp. 38. [Presented by the Government Geologist.]

This report contains, among other things, a section dealing with the Physical Geography of the Kimberley District, and a general description of the country passed over along the coast from the mouth of the De Grey River to Wyndham.

OCEANIA.

Haga, A.—Nederlandsch Nieuw Guinea en de Papoesche Eilanden. Historische Bijdrage, 1500–1883. Batavia, 1884. 8vo. Two volumes, pp. 471 and 496. [Presented by the Batavian Genootschap van Kunsten en Wetenschappen.]

A careful compilation of the records of journeys to and exploration in New Guinea from the time of its discovery. This is the most complete, and probably the most trustworthy, history of New Guinea yet written.

Hatton-Richards, T. H.—Travels with the Hon. Sir William Macgregor, K.C.M.G., Administrator of British New Guinea. Read before the Royal Geographical Society of Australasia, Victorian Branch, 1890. Melbourne, 8vo, pp. 20. [Presented by the Author.]

In this paper, Mr. Hatton-Richards gives an account of two expeditions in British New Guinea in company with Sir William Macgregor. The first of these was made at the end of September, 1889, to Cloudy Bay, situated about 120 miles east of Port Moresby. The whole of the Cloudy Bay district is described as being quite unfit for any extensive European settlement, the climate being extremely unhealthy. The second expedition was made about the middle of November, 1889, to the western division of the Protectorate, and included an ascent of the Fly River for a distance of 610 miles, a visit to the Islands of Saibai and Danan, and an ascent of the Mai Kussa River to as far as it was found practicable. On the way

back, what was believed to be a new river was discovered, in latitude $9^{\circ} 10' S.$ and longitude $141^{\circ} 25' E.$ This river was ascended for about 120 miles, to the approximate position of latitude $8^{\circ} 33'$, longitude $141^{\circ} 41'$. The river at this part was not more than fifteen yards wide. It is described as being very changeable in its course, and the banks low and swampy.

Java.—Die Triangulation von Java ausgeführt vom Personal des Geographischen Institutes in Niederländisch Ost-Indien. Dritte Abtheilung. Ergänzungen zu den beiden ersten Abtheilungen. Genaue Bestimmung des Verhältnisses zwischen dem Normalmeter und des Metro des Archiva. Das Basisnetz vom Sauplak. Die Basismessungen bei Iqantoug und bei Tangol, sowie die beiden dazu gehörenden Basisnetz. Im auftrag des Ministeriums der Kolonen und unter Mitwirkung von J. C. A. Van Asperen, M. L. J. Van Asperen, W. G. Tenissen, und A. A. Nijland, bearbeitet von Dr. J. A. C. Oudemans. Foto, plates, Haag, 1891. [Presented by the Government of the Dutch East Indies.]

Preston, E. D.—Determinations of Latitude and Gravity for the Hawaiian Government. United States Coast and Geodetic Survey. Geodesy. Appendix No. 14. Report for 1888. Large 4to, plates. Washington, 1890.

Details of instruments and methods employed, with tables of latitudes, triangulations, and pendulum observations.

Thomson, Wm. J.—Te Pito Te Henua, or Easter Island. Annual Report of the Smithsonian Institution. Washington, 1889: 447-552. Plates and illustrations.

Easter Island differs, as is well known, from the other islands of the Pacific, not only in its architecture, but by the adornment of its eyeocean ramp, by huge monolithic figures, representing human beings, some of which exceed 50 feet in height, and weigh as many tons. It has also been noted for peculiar carvings resembling hieroglyphs, which have been considered hitherto as merely ornamental designs, but which now prove to be true hieroglyphics capable of translation, and a clue having been obtained, some translations have been made, and are given in the report under notice. A very thorough exploration of the island was made; the number of images (555) recorded, and measurements taken of 113 platforms. Many ancient stone houses were explored, and pictured slabs obtained. The largest image that has been in position is 32 feet long, and weighs about 50 tons, but in the workshop in the crater of Rana Boraka one was found, in an unfinished state, which measured 70 feet in length. These figures were hewn in a recumbent position out of the coarse grey lava, which is there found only in the vicinity of Rana Boraka, and then launched down the slope of the mountain and transported to various parts of the island where the platforms had been erected. The statues when *in situ* were crowned by circular caps of red vesicular tufa, quarried in the Teraai hills. The largest crown was 12½ feet in diameter. Of those that had been in position the weight was about 3 tons. The report is well illustrated by photographic reproductions, and is accompanied by a small but clear map.

GENERAL.

Adami, Franz.—Ein neuer Projektionsglobus. Das Ausland, LXV. (1892): 321-325, 337-340, 356-358.

Description of a model, showing the relation of the earth to the heavenly bodies, and adapted for working out astronomical problems in practical astronomy.

Benoit [Dr.], René.—Études sur la toise de Bessel, la toise No. 9 du Bureau Topographique Royal Prussien et la toise de Pérou. Comptes Rendus de l'Association Géodésique Internationale pour 1891: pp. 110-147.

The result of Dr. Benoit's careful measurement of the old standards was as

follows:—At (16°25 C.) 61·3 Fahr., Bessel's toise measured 1949·061 millimetres; the toise No. 9, 1949·067 millimetres; the toise of Peru, which is a double standard, 1949·001 millimetres between the marked points, and 1949·090 millimetres by end contacts. The practical outcome of the measurement is of considerable importance in French geodetic observations, as it shows that all measurements on the basis of Bessel's toise must be augmented by $\frac{1}{10000}$ th of their previously assumed value.

Börger [Prof. Dr.], C.—Ueber die Berechnung eines einzelnen Hoch- oder Niedrigwassers nach Zeit und Höhe. Berlin, Siegfried Mittler und Sohn, 1892: large 8vo, pp. 47.

A mathematical treatise on the calculation of tidal phases, with tables and worked examples, published by the Deutsche Seewarte in Hamburg, as a supplementary part of the 'Annalen der Hydrographie.'

Caldecott, Alfred.—English Colonization and Empire. London, John Murray, 1891: 8vo, pp. viii. and 277. Maps. Price 3s. 6d. [Presented by the Publishers.]

A concise and clear history of British colonial growth based on geographical and economic considerations. The essential differences in the nature and destiny of the various component parts of the empire are brought out with remarkable distinctness. Although only a sketch, it is well balanced in its proportions, and supplemented by a list of books of reference. The volume is one of Murray's University Extension Manuals, edited by Professor Knight, of St. Andrew's. Clear outline maps illustrate important periods of colonial development, and a set of coloured maps of the world show strikingly the "growth of Aryan predominance." The impartial and scientific method of treatment stands in pleasing contrast to the spirit of many books on the colonies.

Dawson [Dr.], George, and Sutherland, Alexander.—Elementary Geography of the British Colonies. London, Macmillan & Co., 1892: 12mo, pp. xiv. and 330. Illustrations. Price 3s. [Presented by the Publishers.]

In this new volume of Macmillan's Geographical Series we have practically two books bound together, differing in principle of treatment, in literary style, and even in the use of distinctive type for giving prominence to important names. Dr. Dawson treats of the American colonies in a sound manner, basing the whole description on physical geography. Mr. Sutherland, in a somewhat florid style, gives a vivid sketch of the Australian, African, and South Asiatic possessions. India and some of the Asiatic colonies form the subject of another book in the series. The forty-four illustrations, many engraved from photographs, are good, and well chosen; but there is no index—a serious fault.

[Geographical Congress.]—Compte Rendu du cinquième Congrès International des Sciences Géographiques tenu à Berne du 10 au 14 Août, 1891: Berne, Schmidt, Francke, et Cie., 1892: 8vo, Part I., pp. xx. and 816, Parts II. and III.

This report contains a list of members of the Congress, a report of each meeting, with the discussions which took place, and seventy-three memoirs in various languages on all departments of geography. The second part contains the catalogues of the Geographical Exhibition associated with the Congress. An index to the original papers would have greatly enhanced the value of the volume.

Hughes, William, and Williams, J. Francon.—The Advanced Class-Book of Modern Geography. Physical—Political—Commercial. London, G. Philip & Son, 1892: 8vo, pp. xvi. and 818. Price 6s. [Presented by the Publishers.]

As implied by the title, this work is designed for the use of advanced students. The facts and statistics are brought fairly up to date, and there are useful references to original works on geography and travel.

No. VIII.—August 1892.]

2 R

Levasseur, E.—*Division de la terre en cinq parties du monde. Revue de Géographie*, XVI. (1892): 8-16.

A critical revision and recalculation of the area and population of Europe, Asia, Africa, America, and Oceania, originally communicated to the *Académie des Sciences*.

Lovett, Richard.—*James Gilmour of Mongolia; His Diaries, Letters, and Reports.* London, Religious Tract Society, 1892: 8vo, pp. 336. Three portraits, maps and illustrations. Price 7s. 6d. [Presented by the Publishers.]

The professed object of this biography is "to depict, as far as possible, the inner life of James Gilmour, and the real nature of the work he accomplished," as a missionary in Mongolia and North China for twenty years. The results of Mr. Gilmour's remarkable familiarity with the Mongols and their customs have been presented vividly by himself in his 'Among the Mongols,' published in 1882. The biography explains the motives which led him to live amongst these nomads, and later amongst the natives of North China, as one of themselves, eating their food and following their customs as far as a Christian could. The extent to which whisky distilling and drinking, the growing and smoking of tobacco and opium, are carried on in Northern China, and the result of the consequent withdrawal of much land from food-growing, are powerfully described in some of the letters now published. Three appendices are given of some value on 'A Chinese Execution in Mongolia,' 'Chinese Emigration,' and 'The Mongolian Language.' The first particularly is a masterpiece of realistic description.

MaoGregor [Dr.], John.—*Toil and Travel*, being a true story of roving and ranging when on a voyage homeward-bound Round the World. London, T. Fisher Unwin, 1892: 8vo, pp. 335, illustrations. Price 16s. [Presented by the Publisher.]

A superficial account of a homeward voyage from India, during which the author visited Ceylon, several places in Australia, New Zealand, Java, Singapore, Saigon, Hong Kong, and parts of China, Japan, the United States, Mexico, and Canada.

Orpen, Goddard Henry.—*The Song of Dermot and the Earl.* An old French poem, from the Carew Manuscript No. 596, in the Archbishopal Library at Lambeth Palace. Oxford, Clarendon Press, 1892: 8vo, pp. xlii. and 355. Price 8s. 6d. [Presented by the Clarendon Press.]

Mr. Orpen supplies, side by side with the original French, a literal translation of the quaint adventures during the Anglo-Norman invasion of Ireland, which it details. The geographical interest of the volume is centred in a map of *Midhe and Laighin* (the Province of Leinster), showing the position of a great number of places mentioned in the poem, the identification of which has been a special study of Mr. Orpen's.

Parkin, George E.—*Round the Empire.* London, Cassell & Co., 1892: 8vo, pp. xii. and 263. Price 1s. 6d. [Presented by the Publishers.]

This is a brightly-written school-book, giving as correct an idea of the British Empire as is practicable within such small compass, and conceived in the spirit of the wider patriotism which Lord Rosebery in the preface dears to arouse in children by reminding them "that they inhabit not an island but an empire."

Beyer [Dr.], E.—*Ursachen der Deformationen und der Gebirgsbildung.* Leipzig, W. Engelmann, 1892: 8vo, pp. 40, plates. [Presented by the Author.]

An important contribution to the theory of the origin of mountain ranges.

Harrisse, Henry.—Christophe Colomb, les Corses et le Gouvernement Français. Paris, H. Weiler, 1890: large 8vo, pp. 32.

Ruge, Sophus.—Christoph Columbus. Führende Geister. Eine Sammlung von Biographien. Herausgegeben von Dr. Anton Bettelheim. Vierter Band. Dresden, L. Ehlermann, 1892: 12 mo, pp. 163. Map and portrait.

These two volumes are interesting in connection with the forthcoming celebration of the fourth centenary of the discovery of America by Columbus.

NEW MAPS.

(By J. COLES, *Map Curator*, &c. &c.)

EUROPE.

Deutsches Reiches.—Karte des —. Scale 1:100,000, or 1·3 geographical miles to an inch. Herausgegeben von der Kartogr.-Abtheilung der Königl. Preuss. Landes-Aufnahme. Sheets: 65, Gr. Möllen; 186, Prenzlau; 277, Gnesen; 325, Schrimm; 668, Pfort. Price 1s. 6d. each sheet. (*Dulau.*)

England and Wales.—Popular Map of —, showing Roads and Railways. Scale 1:887,000, or 12·2 geographical miles to an inch. W. & A. K. Johnston, Edinburgh and London. Price 2s. on cloth. [Presented by the Publishers.]

This map is taken from the new edition of the Royal Atlas, and in its present form is a very handy map of England and Wales, with an inset plan of London on the scale of four miles to an inch.

Mittel-Europa.—Topographische Spezialkarte von —. Scale 1:200,000, or 2·7 geographical miles to an inch. Herausgegeben von der Kartograph.-Abtheilung der Königlich-preussischen Landes-Aufnahme. No. 292, Dombrowiza; 437, Tarnopol; 606, Maria-Tell; 636, Grnz. Price 1s. 2d. (*Dulau.*)

Peloponnes.—Topographische und hypsometrische Karte des —. Nach der Carte de la Grèce, redigée et gravée au Dépôt de la Guerre, Paris, 1852, (1:200,000), den Britischen Seekarten, sowie eigenen Aufnahmen und Höhenmessungen gezeichnet von Dr. Alfred Philippson. Scale 1:300,000, or 4·1 geographical miles to an inch. Verlag v. R. Friedländer & Sohn, Berlin, 1891. 4 sheets. [Presented by the Publishers.]

This map is a reduction from the map of Greece on the scale of 1:200,000, published by the Dépôt de la Guerre, Paris, 1852; the coast line and depths have been taken from the British Admiralty charts, and the heights have been independently determined by the author. The physical features of the country are shown by a combination of contouring and orographic colouring. Contour lines, both as regards heights and depths, are given for verticals of 100 metres. The land is coloured in six shades, the first indicating an elevation of less than 100 metres, the second under 500 metres, after which the shades indicate changes of altitude of 500 metres. The same method is used with regard to the colouring of the water, in which, however, only five shades are used, as the contour lines are not carried beyond soundings of 2000 metres. The importance of the towns and villages, as regards population, is indicated by the symbol by which it is marked. All railways, roads, and paths are clearly distinguished from one another, and are coloured red, which is a great advantage in a map so covered with contour lines, as they are easily followed with the eye. The map is very nicely drawn, and is in every respect an excellent specimen of cartography.

Roma.—Carta topografica della Provincia di — e Regioni Limitrofe fino ad Avezzano. Spoleto e Gaeta, con Cartina Speciale dei Colli Albani, secondo i recenti rilievi del R. Stato-Maggiore, con speciali indicazioni dell'altimetria, delle reti stadali e delle circoscrizioni amministrative ed elettorali, disegnata da G. E. Fritzsche. Pubblicata dall' Istituto Cartografico Italiano, Roma. Scalo 1:250,000, or 3·4 geographical miles to an inch. Istituto Cartografico Italiano, Roma. Price 3s. [Presented by the Publishers.]

This map is coloured to show the changes in altitude up to 500 metres above sea-level. An inset map of the country round Lago di Albano is given on a scale slightly exceeding a mile to the inch, on which the topographical features are shown by colouring and contours. All means of communication, as well as electoral and administrative boundaries, are laid down, and as the map is very clearly drawn on a conveniently large scale, it is well suited for reference by persons visiting this part of Italy.

Seine.—Carte de la — de Paris à la Mer, par R. Vuillaume. Scale 1:125,000, or 1·7 geographical miles to an inch. 5me. Édition, 1891, à Paris, aux Bureaux du Journal 'Le Yacht.' Price 3s. (Dulau.)

Sweden.—Carte de la Suède à l'échelle de 1:100,000, or 1·3 geographical mile to an inch. Sheets: 23, Hamra; 31, Roma; 39, Visby; 40, Fåro; 48, Lutterhorn; 49, Holmudden; 61, Strömstad (med 60 Koster); 110, Söderhamn.

—.—Carte du Nord de Suède à l'échelle de 1:200,000, or 2·7 geographical miles to an inch. Sheets: 8, Kebnekaise; 9, Kaahslusja; 10, Vittangi; 11, Lainio; 12, Suittalma; 13, St. Sjöfallet; 14, Luletrisk; 15, Gellivare; 16, Pajala; 17, Huuki; 18, Merkenes; 19, Staika; 20, Qvikkjokk; 21, Jokkmokk; 22, Hakkas; 23, Korpilombola; 24, Svansten; 25, Nasafjäll; 31, Öfver Tornea; 38, Haparanda; 59, Gotska Sandön. La Section Topographique de l'État-Major, Stockholm. [Presented by the Chief of the Topographical Section, Swedish General Staff.]

Weissensee in Kärnthen.—Tiefenkarte des —. Nach eigenen Messungen entworfen von Dr. Karl Grissinger. Wien, 1892. Scale 1:30,000, or 2·4 geographical miles to an inch. Petermann's 'Geographische Mitteilungen.' Jahrgang, 1892. Tafel 12. —. Die Fortpflanzung der Sonnenwärme im Weissensee, nach Untersuchungen im September, 1891, von Dr. Karl Grissinger. Petermann's 'Geographische Mitteilungen.' Jahrgang, 1892. Tafel 13. Gotha, Justus Perthes. [Presented by the Publisher.]

ORDNANCE SURVEY MAPS.

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6-Inch.—County Maps:—

ENGLAND AND WALES: Yorkshire. CVIII. s.w., CIX. s.w., s.e., CXXV. s.e., CXXVII. s.e., CXXVIII. s.e., CLXXXVIII. s.w., CXXI. s.e., CCLXIX. s.w.

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ENGLAND AND WALES: Lancashire. XXXIX. 3, 4s. (coloured). Yorkshire. LXXVII. 1, 2, 3, 4, 9, 10, 4s. each; 13, 3s.; 14, LXXXVI. 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, XCIV. 3, 3s., CXXI. 9, CXXII. 1, 2, 3, 4, 4s. each; 5, 6s.; 6, 9, 10, CXXIX. 9, CXCIV. 2, 4s. each; 3, 3s.; 4, 3, 4, 4s. each; 7, 3s.; 8, 4s., CXXXVI. 13, 3s.; CXXXIV. 9, 12, 16, 4s. each; 10, 6s., CXXIV. 1, 6s. each; 2, 3, 5, 6, 4s. each; 7, 6s.; CCLXXIV. 12, 1s.; CCLXXXV. 7, 8, 10, 4s. each; 13, 3s.; 14, 15, CCLXXXV. 1, 4s. each; CCLXXXIX. 1, 4s.; 2, 6s.; CXCII. 1, 5, 4s. each; 9, 3s.; 13, CXXCV. 11, 4s. each; CXC. 1, 2, 5s. each; 3, 6, 4s. each (coloured).

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(Stanford, Agent.)

ASIA.

Wichmann, A. von.—Karte der Insel Rotti, —. Scale 1:500,000, or 6·8 geographical miles to an inch. Petermann's 'Geographische Mitteilungen.' Jahrgang, 1892. Taf. 9. Justus Perthes, Gotha. [Presented by the Publisher.]

AFRICA.

Dahomey.—Carte du —, dressée par A. L. d'Albécas au 1:500,000, or 6·8 geographical miles to an inch. Paris. Price 1s. 6d. (*Dulaus*.)

Tunisia.—Carte de reconnaissance de la —, dressée à l'aide des itinéraires et des levés à vue exécutés de 1881 à 1887, publiée par le service géographique de l'Armée. Scale 1:200,000, or 2·7 geographical miles to an inch. Sheets: XVI., Îles Kerkennah; XXII., Kebilli; XXIV., Ras Tourgueness. Paris. 7d. each sheet. (*Dulaus*.)

AMERICA.

Central America.—Map of —. Scale 1:2,500,000, or 34·5 geographical miles to an inch. Rand, McNally & Co., Chicago and New York, 1892. Price 3s. 2d., on cloth. [Presented by the Publishers through E. Stanford, Esq.]

United States.—Indexed County and Township Pocket Maps and Shipper's Guides of Alabama (scale 1:845,000, or 11·5 geographical miles to an inch). Colorado (scale 1:990,000, or 13·5 geographical miles to an inch). South Carolina (scale 1:1,850,000, or 25·3 geographical miles to an inch). South Dakota (scale 1:1,130,000, or 15·4 geographical miles to an inch). Rand, McNally & Co., Chicago and New York, 1892. Price 1s. 2d. each. [Presented by the Publishers through E. Stanford, Esq.]

AUSTRALASIA.

British New Guinea.—Map of —. Scale 1:1,000,000, or 13·6 geographical miles to an inch. Printed and published at the Surveyor General's Office, Brisbane, 1892. With a map illustrating the whole of New Guinea. Scale 1:5,100,000, or 69·8 geographical miles to an inch. [Presented by the Surveyor General of Queensland.]

This map has been compiled from the latest official maps and charts, and shows the results of recent explorations and discoveries. A very good general map of New Guinea is given in the form of an inset, together with plans of Port Moresby, and Samarai or Dinner Island.

CHARTS.

Admiralty.—Charts and plans published at the Hydrographic Department, Admiralty, in May and June, 1892.

No.	Inches.	
2598		Curves of Equal Magnetic Variation, 1895. 3s. 6d.
1864	m = 6·9	Scotland, west coast:—Campbelton loch. 1s. 6d.
73	m = 12·2	Spain, north coast:—Port Passages. 1s. 6d.
1657	m = 0·63	Mediterranean, Greece:—Gulf of Athens, and entrance to the Petali Gulf. Price 2s. 6d.
1513	m = 1·0	Mediterranean, Greece:—Athens to the isthmus of Corinth, including Salamis, Eleusis, Megara and Kekhries bays, and the northern portion of the island of Ægina. 2s. 6d.

No.		Inches.	
2074	m =	0.28	Mediterranean:—Cyprus (plan Kerynia). 2s. 6d.
2765	m =	2.4	Mediterranean, Syria:—Road island anchorage. 1s. 6d.
1663	{m = m =	{1.0 3.6	Newfoundland, west coast:—Bonno bay. Head harbour, or Pic à Denis. 1s. 6d.
1677	m =	1.9	Newfoundland, west coast:—St. Margaret bay and Castors harbour. 1s. 6d.
2818	m =	1.8	North America, East Coast Virginia:—Hampton roads and Elizabeth river. 2s.
393	m =	various	West Indies, Bahamas:—San Salvador, or Watling island. Anchorage on south-west side of Acklin island. Crooked island anchorages. Crooked island anchorage. Port Nelson. Mariguana island. 1s. 6d.
1300	m =	various	South America, west coast:—Maitencillo cove. Algarrobo road. Yilos road. Ligua bay. Pichidangué bay. Port Papudo. Horeon and Quintero bays. 1s. 6d.
722	m =	6.0	Seychelles group:—Approaches to port Victoria. 2s. 6d.
775	m =	1.0	China sea, Tong King gulf:—Approaches to Haifong. 2s. 6d.
1937	m =	2.0	Australia, east coast:—Adolphus channel with Albany pass. 2s. 6d.
253a			Jebel Jan to Seyara:—Plan added, Jibuti bay.
935			Java sea:—New plans, Labuan Tering bay. Kulewatie bay.

(J. D. Potter, Agent.)

CHARTS CANCELLED.

No.		Cancelled by	No.
2598	Curves of equal magnetic variation	{ New chart. Curves of equal magnetic variation	2598
1864	Campbelton loch	New plan. Campbelton loch	1864
73	Port Pasages	New plan. Port Pasages	73
1513	Athens to Corinth	{ New chart. Athens to the isthmus of Corinth	1513
1657	Part of the gulf of Athens	New chart. Gulf of Athens	1657
2074	Cyprus	New chart. Cyprus	2074
2765	Road island anchorage	New plan. Road island anchorage	2765
2818	Hampton roads and Elizabeth river	{ New plan. Hampton roads and Elizabeth river	2818
393	Providence channels to Windward, and Mona passages	{ New plans. Ports and anchorages in the Bahamas	393
1300	Port Papudo. Horeon and Quintero bays	{ New plans. Maitencillo cove. Algarrobo road, etc... ..	1300
1307	Maitencillo cove. Pichidangué bay. Algarrobo and Ligua road		
722	Approaches to Port Victoria	{ New plan. Approaches to port Victoria	722
1937	Port Albany	{ New plan. Adolphus channel with Albany pass.	1937

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 2040, England, south coast:—The Solent. 2268, England, south coast:—Portland harbour. 2669b, English channel:—Channel islands, sheet 2. 2711, Adriatic sea:—Cape Promontore to Grossa island. 2177, Arctic:—Baffin bay. 1631, Labrador:—Blanc Sablon, Forteau bay. 712, Newfoundland, west coast:—Cowhead harbour, etc. 302, Newfoundland, south coast:—Couteau bay to Cape Auguille. 2853, Gulf of Mexico:—Mississippi sound and Mobile bay. 2897, Gulf of Mexico:—Tampa bay. 2431, North America, west coast:—Port Simpson to Cross sound. 1003, Africa, east coast:—River Pungue. 830, Bay of Bengal:—Bassein river to Pulo Penang. 825, Bay of Bengal:—Andaman islands. 2761, Sumatra, west coast:—Tyingkuk bay to the strait of Sunda. 895, Java sea. Allas strait. 943, Philippine islands:—Molucca passage to Manila. 1558, Korea:—Crichton harbour. 2747a, Australia, south coast:—Port Phillip entrance. 1171a, Australia, south coast:—Port Phillip. 2731, Australia, south coast:—Geelong harbour. 2122, New Guinea, south coast:—Round head to Orangerie bay.

(*J. D. Potter, Agent.*)

North Atlantic Ocean.—Pilot Chart of the ——. July, 1892. With a Supplement showing "North Atlantic Ice Reported since May 1st, on or near the Grand Banks of Newfoundland." Published at the Hydrographic Office, Bureau of Navigation, Navy Department, Washington, D.C. Richardson Clover, Lieutenant Commander, U.S.N., Hydrographer.

ATLASSES.

Johnston, W. & A. K.—Royal Atlas of Modern Geography. Edition in monthly parts. Part IX., containing maps 21 and 27. W. & A. K. Johnston, Edinburgh and London, 1892. Price 4s. 6d. each part. [Presented by the Publishers.]

The present issue of this atlas contains two maps, one of which is of the Austro-Hungarian Monarchy, and the other of South-west Russia, on which an inset plan is given of Odessa. As usual with this atlas, each map is accompanied by a full index.

Universal Atlas, The.—Complete in 28 parts, including index. Published by Cassell & Co., Limited, London, for the Atlas Publishing Company, Limited. Part XVI. Price 1s. each part. [Presented by the Publishers.]

The present issue of this atlas contains a map of Northern India on two sheets, in which, as regards orthography, Dr. Hunter's system has been adopted. All means of communication are shown, and, for its scale, it is a good useful map. The remaining two sheets are occupied by maps of the eastern and western portions of the Mediterranean Sea and the neighbouring countries.

PHOTOGRAPHS.

Finland.—Photograph of a Finnish Sacred Tree. Taken by Monsieur A. Grigorief, Secretary to the Imperial Russian Geographical Society. [Presented by Monsieur A. Grigorief.]

This photograph of a Finnish sacred tree, "Karsiko," is interesting as illustrating a superstition which exists in Finland. The tree represented in the photograph is a very fine specimen, and is situated about four kilometres

from the "Uski Kirko," or Ny Kerka post-station, Finland, about sixty kilometres from Wiborg. In the photograph the tree is seen to be covered with tablets, which have been nailed to it by some member of the family of a deceased person, whose body has been carried past the tree on its way to the churchyard. The intention of these tablets is to prevent the return of persons who have been buried to their homes, and the people believe that any one who removes such a tablet will be haunted by the ghost of the man to whose memory it has been erected, unless he contrives to send it to some other person by sprinkling some of the sap of the tree on his house. The tablets have inscribed on them the year in which the person, in whose memory they are placed, died, and a cross, but the name is never given.

British Guiana.—One hundred and twenty-two Photographs of —. [Presented by E. im Thurn, Esq.]

This series of 122 photographs of British Guiana has been presented to the Society by Mr. im Thurn, all of which, with a few exceptions, have been taken by himself. They may be regarded as two sets—one, numbering 106, illustrates the nature of the country, the swampy mangrove tract which was Nature's defence against the wash of the sea along the whole coast of the country, until the Dutch early colonists built sea dams along some of the more southern parts of the coast, and which still continues the defence along certain parts of the coast, especially toward the north-west; the forest tract which immediately succeeds the mangrove tract, and the savannah tract of the interior. Illustrations are also given of the gold industry which has lately been developing so rapidly within this forest tract, and of the three somewhat primitive methods of obtaining gold there practised—the battel, the tom, and the sluice. A large number of this first set of photographs are of the various tribes of Indians inhabiting the country—Caribs, Warraus, Arawacks, Ackawais, and half-breeds between these and negroes, Portuguese, Spaniards, and Scotch. Among these photographs of Indians the most interesting are a series of twenty-four, illustrating the games played by these primitive folk, a subject on which Mr. im Thurn is about to bring out a book. The second set, sixteen in number, illustrate a phase of European life in those tropical parts. These are all of the house and garden at Marzasseema, where, as special magistrate of the Pomeroon River, Mr. im Thurn lived for some eight years. It may be added that for the last two years he has been Government Agent of the North-Western District of the Colony; and that the earlier-mentioned series of photographs gives examples of the Government stations, police barracks, hospitals, &c., which, in that capacity, Mr. im Thurn has built in that district, and which, until he took it over a few years ago, was uninhabited by any but aboriginal Indians.

Somali-Land.—Forty-two Photographs of —. Taken by C. H. Villiers, Esq., Royal Horse Guards. 1891. [Presented by C. H. Villiers, Esq.]

These photographs were taken by Mr. C. H. Villiers, Royal Horse Guards, during a shooting expedition in the Somali-Land. They represent different phases of camp life, and well-chosen views characteristic of the scenery and natives. Among the latter are photographs of Somalis galloping down to reconnoitre the European camp, native women carrying water, and some well-chosen groups, which convey an accurate idea of the dress, equipments, and general appearance of the natives.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.



R. Seaborn
Malindi



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CHRISTOPHER COLUMBUS.

(From the Portrait now in the Gallery of Paolo Guerin.)

Painted by agreement of the Senate, Nobile, A. de' Orsini, et C.

PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

Columbus, and the Fourth Centenary of his Discovery.

BY CLEMENTS R. MARKHAM, Esq., C.B., F.R.S.

(Read at the Evening Meeting, June 20th, 1892.)

IN the present year the fourth centenary of the discovery of America by Columbus will be celebrated with great enthusiasm in Spain, in Italy, and in America. That discovery was, without any doubt, the most momentous event since the fall of the Roman empire in its effect on the world's history. In its bearings on our science, the light thrown across the sea of darkness by the great Genoese was nothing less than the creation of modern geography. It seems fitting, therefore, that this Society should take some share in the commemoration, and that we should devote one evening in this Session to a consideration of some leading points in the life of the foremost of all geographers.

We have all probably read our Washington Irving; but since that charming writer published his biography, the life of Columbus has been a subject of untiring research; new documents have been discovered; the chief authorities—Las Casas and Bernaldez—have been printed for the first time, yet several points are still matters of controversy. We might do useful service by considering these controverted questions, and thus offer our contribution to the practical work of the centenary celebration. I propose to submit to the meeting this evening the principal matters deserving of attention, some of which are as yet unsettled. Controversies surround the biography of Columbus from his cradle. We have to decide upon the place and date of his birth, and on the events of his youth. The next point is the character of the assembly at Salamanca. We may pause to consider the size and build of his ships. We ought finally to settle the landfall of Columbus, and also to clear away a misapprehension respecting his reckoning on the return voyage after his great achievement. Lastly, we may usefully consider the voyages of Cabot and Cortereal in their bearings on the work of Columbus, and examine the evidence for and against the alleged

first voyage of Amerigo Vespucci. Having done our part in the centenary by considering and discussing these controverted points, we may well conclude our review by heartily joining with the good and just historian Las Casas, in an expression of warm admiration for the genius and the lofty qualities of the greatest of all geographical discoverers.

Much new light has been thrown upon the birth and early life of Columbus of late years by the careful examination of monastic and notarial records at Genoa and Savona. At Genoa the original documents are still preserved. At Savona they no longer exist, and we are dependent on copies made two centuries ago by Salinerius. But both the Genoa and Savona records may be safely accepted, and we are thus furnished with a new and more interesting view of the early life of Columbus. Our thanks for this new light are mainly due to the laborious and scholarly researches of the Marchese Marcello Staglieno of Genoa, and to the work of Mr. Harriase. We may take it as fully established that the original home of Giovanni Colombo, the grandfather of the great discoverer, was at Terrarossa, a small stone house, the massive walls of which are still standing on a hill-side forming the northern slope of the beautiful valley of Fontanabuona. Here, no doubt, the father of Columbus was born; but the family moved to Quinto-al-Mare, then a fishing village about 5 miles east of Genoa. Next we find the father, Domenico Colombo, owning a house at Quinto, but established at Genoa as a wool weaver, with an apprentice. This was in 1439. A few years afterwards Domenico found a wife in the family of a silk weaver who lived up a tributary valley of the Bisagno, within an easy walk of Genoa. Quezzi is a little village high up on the west side of a ravine, with slopes clothed to their summits in olive and chestnut foliage, whence there is a glorious view of the east end of Genoa, including the church of Carignano, and the Mediterranean. On the opposite slope are the scattered houses of the hamlet of Ginestrato. From this village of Quezzi Domenico brought his wife, Susanna Fontanarossa, to Genoa, her dowry consisting of a small property, a house or a field, at Ginestrato.

About the home of Domenico and his wife at Genoa during at least twenty years there is absolute certainty. The old gate of San Andrea is still standing, with its lofty arch across the street, and its high flanking towers. A street with a rapid downward slope, called the *Vico Dritto di Ponticelli*, leads from the gate of San Andrea to the church of S. Stefano; and the house of Domenico Colombo was in this street, a few doors from the gate. It was the weavers' quarter, and S. Stefano was their parish church, where they had a special altar. Domenico's house had two stories besides the ground floor; and there was a back garden, with a well between it and the city wall. It was battered down during the bombardment of Genoa in the time of

Louis XIV., was rebuilt with two additional storeys, and is now the property of the city of Genoa.

This was the house of the parents of Columbus, and at a solemn moment, shortly before his death, Columbus stated that he was born in the city of Genoa. No. 37, Vico Dritto di Ponticelli, was, therefore, in all probability the house where the great discoverer was born, and the old church of San Stefano, with its façade of alternate black and white courses of marble, and its quaint old campanile, was the place of his baptism. The date of his birth is fixed by three statements of his own, and by a justifiable inference from the notarial records. He said that he went to sea at the age of fourteen, and that when he came to Spain in 1485 he had led a sailor's life for twenty-three years. He was, therefore, born in 1447. In 1501 he again said that it was forty years since he first went to sea when he was fourteen: the same result—1447. In 1503 he wrote that he first came to serve for the discovery of the Indies—that is, that he left his home at the age of twenty-eight. This was in 1474, and the result is again 1447. The supporting notarial evidence is contained in two documents, in which the mother of Columbus consented to the sale of property by her husband. For the first deed, in May, 1471, the notary summoned her brothers to consent to the execution of the deed, as the nearest relations of full age. The second deed is witnessed by her son Cristoforo in August, 1473. He must have attained the legal age of twenty-five in the interval. This again makes 1447 the year of his birth.

The authorities who assign 1430 as the year of his birth rely exclusively on the guess of a Spanish priest, Dr. Bernaldez, Cura of Palacios, who made the great discoverer's acquaintance towards the end of his career. Bernaldez, judging from his aged appearance, thought that he might be seventy years of age, more or less, when he died. The use of the phrase "more or less" proves that Bernaldez had no information from Columbus himself, and that he merely guessed the years of the prematurely aged hero. This is not evidence. The three different statements of Columbus, supported by the corroborative testimony of the deeds of sale, form positive evidence, and fix the date of the birth at 1447.

We know the place and date of the great discoverer's birth, thanks to the researches of the Marchese Staglieno. The notarial records, combined with incidental statements of Columbus himself, also tell us that he was brought up, with his brothers and sister, in the Vico Dritto at Genoa; that he worked at his father's trade and became a "lanerio," or wool weaver; that he moved with his father and mother to Savona in 1472; and that the last document connecting Cristoforo Colombo with Italy is dated on August 7th, 1473. After that date—doubtless very soon after that date when he is described as a wool weaver of Genoa—Columbus went to Portugal at the age of twenty-eight. But we also

know that, in spite of his regular business as a weaver, he first went to sea in 1461, at the age of fourteen, and that he continued to make frequent voyages in the Mediterranean and the Archipelago—certainly as far as Chios—although his regular trade was that of a weaver.

This is not a mere question of places and dates. These facts enable us to form an idea of the circumstances surrounding the youth and early manhood of the future discoverer, of his training, of the fuel which lighted the fire of his genius, and of the difficulties which surrounded him. Moreover, a knowledge of the real facts serves to clear away all the misleading fables about student life at Pavia, about service with imaginary uncles who were corsairs or admirals, and about galleys commanded for King René. Some of these fables are due to the mistaken piety of the great discoverer's son Fernando, and to others, who seem to have thought that they were doing honour to the memory of the admiral by surrounding his youth with romantic stories. But the simple truth is far more honourable, and, indeed, far more romantic. It shows us the young weaver loving his home and serving his parents with filial devotion, but at the same time preparing, with zeal and industry, to become an expert in the profession for which he was best fitted, and even in his earliest youth making ready to fulfil his high destiny.

I believe that Columbus had conceived the idea of sailing westward to the Indies even before he left his home at Savona. My reason is, that his correspondence with Toscanelli on the subject took place in the very year of his arrival in Portugal. That fact alone involves the position that the young weaver had not only become a practical seaman, well versed in all the astronomical knowledge necessary for his profession, a cosmographer, and a draughtsman, but also that he had carefully digested what he had learnt, and had formed original conceptions. It seems wonderful that a humble weaver's apprentice could have done all this in the intervals of his regular work. Assuredly it is most wonderful; but I submit that his correspondence with Toscanelli in 1474 proves it to be a fact. We know that there were the means of acquiring such knowledge at Genoa in those days—that city was indeed the centre of the nautical science of the day. Benincasa, whose beautiful *Portolani* may still be seen at the British Museum, and in other collections, was in the height of his fame as a draughtsman at Genoa during the youth of Columbus; so was Pareto. In the workrooms of these famous cartographers the young aspirant would see the most accurate charts that could then be produced very beautifully executed; and his imagination would be excited by the appearance of all the fabulous islands on the verge of the unknown ocean.

When the time arrived for Columbus to leave his home, he naturally chose Lisbon as the point from whence he could best enlarge his experience and mature his plans. Ever since he could remember he had seen

the inscriptions respecting members of the Pasagni family, as we may see them now, carved on the white courses of the west front of San Stefano, his parish church. These Genoese Pasagni had been hereditary Admirals of Portugal; they had brought many Genoese seamen to Lisbon: the Cross of St. George marked their exploits on the *Portolani*, and Portugal was thus closely connected with the tradition of Genoese enterprise. So it was to Lisbon that Columbus and his brother made their way, and it was during the ten years of his connection with Portugal that his cosmographical studies, and his ocean voyages from the Equator to the Arctic circle, combined with his genius to make Columbus the greatest seaman of his age.

Another point to which I would call your attention is the assembly at Salamanca. When Columbus submitted his proposition to the Spanish sovereigns, they referred it to a committee, presided over by Father Talavera, which sat at Cordova, and condemned it as impracticable. It is generally supposed that the proposals of the Genoese were subsequently submitted to an assembly of learned persons at the University of Salamanca, and again condemned. There is no good contemporary authority for this, and it appears to be founded on a complete misapprehension of the facts. The truth respecting the Salamanca conferences was quite different. Columbus was gifted with a charming manner, simple eloquence, and great powers of clear exposition. It was an intellectual treat to hear him recount his experiences, and the arguments for his scheme. Among those who first took an interest in his conversation, and then became a sincere and zealous friend, was Dr. Diego Deza, the Prior of the great Dominican convent of San Estevan, and Professor of Theology at Salamanca. Having resolved to befriend Columbus, he very shrewdly foresaw that the most effectual way of doing so would be by affording ample opportunities of discussing the questions raised by the stranger, and thus dissipating the unfavourable impressions caused by the decision of Talavera's committee. For this object there could be no better place than the University of Salamanca, where numerous learned persons were assembled, and where the Court was to pass the winter. The good Prior determined not to lodge his guest in the convent within the city, but in a country farm belonging to the Dominicans, called Valcubo, a few miles outside, situated on a slight eminence, and surrounded by pretty rural scenery. Hither the Dominican monks came to converse with their guest on the great deductions he had drawn from the study of scientific books, and from his vast experience, discussing the reconciliation of his views with orthodox theology. The monks were often accompanied in their walks by learned professors, and by persons of distinction connected with the Court. Later in the winter, Deza and his monks received company in the hall of their convent, when Columbus came into the city and held conferences with men of learning, at which numerous courtiers were

present. These assemblages for discussion, sometimes in the quiet shades of Valcuelo, sometimes in the great hall of the convent, excited much interest among the students and at Court. The kindly object of Deza was secured, the question was fully ventilated, and it was generally admitted that the proposition of Columbus was a fitting subject for discussion. The result was, that the illustrious Genoese secured many powerful friends at Court, who turned the scale in his favour when the crucial time arrived. Such is the slight basis on which the story of the official decision of the Salamanca University against Columbus rests.

The residence at Valcuelo was a peaceful oasis in the stormy life of the great discoverer. The little grange still stands at a distance of about three miles west of Salamanca, and the country people have a tradition that, on the crest of a small hill near the house, now called "tero de Colon," the future discoverer used to pass long hours conferring with his visitors or reading in solitude. The present owner, Don Martin de Solis, has erected a monument on this hill, consisting of a stone pyramid surmounted by a globe; it commemorates the spot where our storm-tossed hero enjoyed a brief interval of peace and rest.

The next point which has given rise to research in recent times is the size and equipment of the ships.

Captain Duro, of the Spanish Navy, has investigated all questions relating to the ships of the Columbian period and their equipment with great care; and the learning he has brought to bear on the subject has produced very interesting results. The two small caravels provided for the voyage of Columbus by the town of Palos were only partially decked. The *Pinta* was strongly built, and was originally lateen-rigged on all three masts, and she was the fastest sailer in the expedition; but she was only 50 tons burden, with a complement of 18 men. The *Niña*, so-called after the Niño family of Palos, who owned her, was still smaller, being only 40 tons. These two vessels were commanded by the Pinzons, and entirely manned by natives of the province of Huelva. The third vessel was much larger, and did not belong to Palos. She was called a "nao," or ship, and was of about 100 tons burden, completely decked, with a high poop and forecastle. Her length has been variously estimated. Two of her masts had square sails, the mizen being lateen-rigged. The foremast had a square foresail, the mainmast a mainsail and maintopsail, and there was a spritsail on the bowsprit. The courses were enlarged, in fair weather, by lacing strips of canvas to their leeches, called *bonetas*. There appear to have been two boats—one with a sail, and the ship was armed with lombards. The rigs of these vessels were admirably adapted for their purpose. The large courses of the caravels enabled their commanders to lay their courses nearer to the wind than any clipper ship of modern times. The crew of the ship *Santa Maria* numbered 52 men all told, including the admiral. She was owned by the renowned pilot Juan de la Cosa of Santoña, who

sailed with Columbus on both his first and second voyages, and was the best draughtsman in Spain. Mr. Harriase, and even earlier writers, such as Vianello, call him a Basque pilot, apparently because he came from the north of Spain; but Santoña, his birthplace, although on the coast of the Bay of Biscay, is not in the Basque provinces; and if Juan de la Cosa was a native of Santoña he was not a Basque. While the crews of the two caravels all came from Palos or its neighbourhood, the men of the *Santa Maria* were recruited from all parts of Spain, two from Santoña besides Juan de la Cosa, which was natural enough, and several others from northern ports, likewise attracted, in all probability, by the fame of the Santoña pilot. Among these it is very interesting to find an Englishman, who came from the little town of Lajes, near Coruña.

Our countryman is called in the list "Tallarte de Lajes" (Ingles). It is not unlikely that an English sailor, making voyages from Bristol or from one of the Cinque Ports to Coruña, may have married and settled at Lajes. But what can we make of "Tallarte?" Spaniards would be likely enough to prefix a "T" to any English name beginning with a vowel, and they would be pretty sure to give the word a vowel termination. So, getting rid of these initial and terminal superfluities, there remains Allart, or Alard. This was a famous name among the sailors of the Cinque Ports. Gervaise Alard of Winchelsea in 1306 was the first English admiral; and there were Alards of Winchelsea for several generations, who were renowned as expert and daring sailors. One of them, I believe, sailed with Columbus on his first voyage, and perished at Navidad.

Columbus took with him the map furnished by Toscanelli. It is unfortunately lost. But the globe of Martin Behaim, drawn in 1492—the very year of the sailing of Columbus—shows the state of knowledge on the eve of the discovery of America. The lost map of Toscanelli must have been very like it, with its islands in mid-Atlantic, and its archipelago grouped round Zipango, near the coast of Cathay. This globe deserves close attention, for its details must be impressed on the minds of all who would understand what were the ideas and hopes of Columbus when he sailed from Palos.

Friday, August 3rd, 1492, when the three little vessels sailed over the bar of Saltes, was a memorable day in the world's history. It had been prepared for by many years of study and labour, by long years of disappointment and anxiety, rewarded at length by success. The proof was to be made at last. To the incidents of that famous voyage nothing can be added. But we may at least settle the long disputed question of the landfall of Columbus. It is certainly an important question. There are the materials for a final decision, and we ought to know for certain on what spot of land it was that the admiral knelt when he sprang from the boat on that famous 12th of October, 1492.

The learned have disputed over the matter for a century, and no

less than five islands of the Bahama group have had their advocates. This is not the fault of Columbus, albeit we only have an abstract of his journal. The island is there fully and clearly described, and courses and distances are given thence to Cuba, which furnish data for



fixing the landfall with precision. Here it is not a case for the learning and erudition of Navarrete, Humboldts, and Varnhagens. It is a sailor's question. If the materials from the journal were placed in the hands of any midshipman in Her Majesty's Navy, he would put his

finger on the true landfall within half an hour. When sailors took the matter in hand, such as Admiral Becher, of the Hydrographic Office, and Lieutenant Murdoch, of the United States Navy, they did so.

Our lamented associate, Mr. R. H. Major, read a paper on this



interesting subject on May 8th, 1871, in which he proved that Watling Island was the Guanahani or San Salvador of Columbus. He did so by two lines of argument—the first being the exact agreement between the description of Guanahani in the journal of Columbus, and Watling

Island, a description which cannot be referred to any other island in the Bahama group; and the second being a comparison of the maps of Juan de la Cosa and of Herrera with modern charts. He showed that out of twenty-four islands on the Herrera map of 1600, ten retain the same names as they then had, thus affording stations for comparison; and the relative bearings of these ten islands lead us to the accurate identification of the rest. The shapes are not correct, but the relative bearings are, and the Guanahani of the Herrera map is thus identified with the present Watling Island. Mr. Major, by careful and minute attention to the words of the journal of Columbus, also established the exact position of the first anchorage as having been a little to the west of the south-east point of Watling Island.

I cannot leave the subject of Mr. Major's admirable paper without expressing my sense of the loss sustained by comparative geography when his well-known face, so genial and sympathetic, disappeared from among us. The biographer of Prince Henry the Navigator, Major did more than any other Englishman of this century to bring the authentic history of Columbus within the reach of his countrymen. His translations of the letters of the illustrious Genoese, and the excellent critical essay which preceded them, are indispensable to every English student of the history of geographical discovery who is not familiar with the Spanish language, and most useful even to Spanish scholars. His knowledge of the history of cartography, his extensive and accurate scholarship, and his readiness to impart his knowledge to others, made him a most valuable member of the Council of this Society, and one whose place is not easy to fill; while there are not a few among the Fellows who, like myself, sincerely mourn the loss of a true and warm-hearted friend.

When we warmly applauded the close reasoning and the unassailable conclusions of Major's paper, we supposed that the question was at length settled; but as time went on, arguments in favour of other islands continued to appear, and an American in a high official position even started a new island, contending that Samana was the landfall. But Fox's Samana and Varnhagen's Mayaguana must be ruled out of court without further discussion, for they both occur on the maps of Juan de la Cosa and Herrera, on which Guanahani also appears. It is obvious that they cannot be Guanahani and themselves at the same time; and it is perhaps needless to add that they do not answer to the description of Guanahani by Columbus, and meet none of the other requirements.

On this occasion it may be well to identify the landfall by another method, and thus furnish some further strength to the arguments which ought to put an end to the controversy. Major established the landfall by showing the identity between the Guanahani of Columbus and Watling Island, and by the evidence of early maps. There is still another method, which was adopted by Lieutenant Murdoch, of the United States Navy, in

his very able paper. Columbus left Guanahani and sailed to his second island, which he called Santa Maria de la Concepcion; and he gives the bearing and distance. He gives the bearing and distance from this second island to the north end of a third, which he called Fernandina. He gives the length of Fernandina. He gives the bearing and distance from the south end of Fernandina to a fourth island named Isabella, from Isabella to some rocks called Islas de Arena, and from Islas de Arena to Cuba.

It is obvious that if we trace these bearings and distances backwards from Cuba, they will bring us to an island which must necessarily be the Guanahani or San Salvador of Columbus. This is the sailor's method. On October 27th, when Columbus sighted Cuba at a distance



of 20 miles, the bearing of his anchorage at sunrise of the same day, off the Islas de Arena, was N.E. 58 miles, and from the point reached in Cuba it was N.E. 75 miles. The Ragged Islands are 75 miles from Cuba, therefore the Islas de Arena of Columbus are identified with the Ragged Islands of modern charts. The Islas de Arena were sighted when Columbus was 56 miles from the south end of Fernandina, and E.N.E. from Isabella. These bearings show that Fernandina was Long Island, and that Isabella was Crooked Island, of modern charts. Fernandina was 20 leagues long N.N.W. and S.S.E.; Long Island is 20 leagues long N.N.W. and S.S.E. Santa Maria de la Concepcion was several miles east of the north end of Fernandina, but in sight. Rum Cay is several miles east of the north end of Long Island, but in sight.

Rum Cay is, therefore, the Santa Maria of Columbus. San Salvador or Guanahani was 21 miles N.W. from Santa Maria de la Concepcion. Watling Island is 21 miles N.W. from Rum Cay; Watling Island is, therefore, proved to be the San Salvador or Guanahani of Columbus.

The spot where Columbus first landed in the New World is the eastern end of the south side of Watling Island. This has been established by the arguments of Major, and by the calculations of Murdoch beyond all controversy. The evidence is overwhelming. Watling Island answers to every requirement and every test, whether based on the admiral's description of the island itself, on the courses and distances thence to Cuba, or on the evidence of early maps. We have thus reached a final and satisfactory conclusion, and we can look back on that momentous event in the world's history with the certainty that we know the exact spot on which it occurred—on which Columbus touched the land when he sprang from his boat with the standard waving over his head.*

The discoveries of Columbus, during his first voyage, as recorded in his journal, included part of the north coast of Cuba, and the whole of the north coast of Española. The journal shows the care with which the navigation was conducted, how observations for latitude were taken, how the coasts were laid down—every promontory and bay receiving a name—and with what diligence each new feature of the land and its inhabitants was examined and recorded. The genius of Columbus would not have been of the same service to mankind if it had not been combined with great capacity for taking trouble, and with habits of order and accuracy. In considering the qualities of the great Genoese as a seaman and an explorer, we cannot fail to be

* Navarrete thought that Turk Island was the island, the most southern of the Bahama group, because he erroneously assumed that Columbus always shaped a westerly course in sailing from island to island; and Turk Island, being furthest east, would give most room for such a course. This island has large lagoons, and is surrounded by a reef. So far it resembles Guanahani. But the second island, according to Navarrete, is Calicoe, bearing W.N.W., while the second island of Columbus bore S.W. from the first. The third island of Columbus was in sight from the second. Inagua Chica, Navarrete's third island, is not in sight from Calicoe. The third island of Columbus was 60 miles long. Inagua Chica is only 12 miles long. The fourth island of Columbus bore east from the third. Inagua Grande, Navarrete's fourth island, bears south-west from Inagua Chica.

Cat Island was the landfall advocated by Washington Irving and Humboldt, mainly on the ground that it was called San Salvador on the West India map in Blaeu's Dutch atlas of 1635. But this was done for no known reason but the caprice of the draughtsman. D'Anville copied from Blaeu in 1746, and so the name got into some later atlases. Cat Island does not meet a single one of the requirements of the case. Guanahani had a reef round it, and a large lagoon in the centre. Cat Island has no reef and no lagoon. Guanahani was low; Cat Island is the loftiest of the Bahamas. The two islands could not be more different. Of course, in conducting Columbus from Cat Island to Cuba, Washington Irving is obliged to disregard all the bearings and distances given in the journal.

impressed with this accuracy, the result of incessant watchfulness and of orderly habits. Yet it is his accuracy which has been called in question by some modern writers, on the ground of passages in his letters which they have misinterpreted, or failed to understand. In every instance the blunder has not been committed by Columbus, but by his critics.

A case in point occurred, with regard to his landfall, on the return from the first voyage. Columbus had resolved not to attempt a passage in the face of the trade wind which had wafted him from the Canaries to Guanahani, but to shape a north-easterly course direct for Spain. The *Santa Maria* being lost, he returned, as is well known, in the little *Niña*, of 40 tons. In bad weather it was impossible to observe either with quadrant or astrolabe; but the care with which every sign was watched, and every calculation worked out, by the admiral, made his pilotage the wonder of his own and of all succeeding ages. After days of furious storm, with sun and stars always obscured, he knew where the vessel was within a few miles. He expected to sight one of the Azores on the very day that *Santa Maria* hove in sight. Yet it is on this very point that Columbus has been gravely accused of carelessness and inaccuracy. There is a copy of his letter addressed to the Escribano de Racion, at Simancas, in which he briefly recounted the results of his memorable voyage for the information of the sovereigns. It has been translated by Mr. Major; and from the older copy from which this copy was taken the first printed versions appear to have been reproduced. It is dated on board the caravel off the Canary Islands on February 15th, 1493. This has been eagerly seized upon by hostile critics as evidence of the admiral's ignorance, or carelessness, or both. Yet this is the most absurd charge that has ever been brought against the admiral; for every candid inquirer would at once assume that the mistake was due to the copying clerk, not to the reckoning of Columbus; and this, indeed, turns out to be the simple truth. In 1858, Baron Varnhagen discovered another manuscript of the letter at Valencia, dated on board the caravel off the Island of Santa Maria on February 18th, 1493. *Santa Maria* is written in one word with the first word *Santa* abbreviated, and a small *m*; and the Simancas copying clerk mistook *Stamaria* for *Canaria*. The admiral's letters do not show him to be either careless or inaccurate. On the contrary, they bear witness to his watchfulness, to his methodical habits, and to his attention to details; although at the same time they are full of speculations, and of the thoughts which followed each other so rapidly in his imaginative brain. It was, indeed, the combination of these two qualities, of practical and methodical habits of thought, with a vivid imagination, which constituted his genius—a combination as rare as it is valuable. It created the thoughts which conceived the great discovery, as well as the skill and ability which achieved it.

Unfortunately, the journals and charts of Columbus are lost. But we have the full abstract of the journal of his first voyage, made by Las Casas, we have his letters and despatches, and we have the map of his discoveries, except those made during his last voyage, drawn by his own pilot and draughtsman, Juan de la Cosa. We are thus able to obtain a sufficient insight into the system on which his exploring voyages were conducted, and into the sequence in which his discoveries followed each other. This is the point of view from which the labours of the admiral are most interesting to geographers. The deficient means at the disposal of a navigator in the end of the fifteenth century increased the necessity for a long apprenticeship. It is much easier to become a navigator with the aid of modern instruments constructed with extreme accuracy, and with tables of logarithms, nautical almanacs, and Admiralty charts. With ruder appliances Columbus and his contemporaries had to trust far more to their own personal skill and watchfulness, and to ways of handling and using such instruments as they possessed, which could only be acquired by constant practice, and the experience of a lifetime. Even then an insight and ability which few men possess were required to make such a navigator as Columbus.

The first necessity for a pilot who conducts a ship across the ocean, when he is for many days out of sight of land, is the means of checking his dead reckoning by observations of the heavenly bodies. But in the days of Columbus such appliances were very defective, and at times altogether useless. There was an astrolabe adapted for use at sea by Martin Behaim, but it was very difficult to get a decent sight with it, and Vasco da Gama actually went on shore and rigged a triangle when he wanted to observe for latitude. If this was necessary, the instrument was useless as a guide across the pathless ocean. Columbus, of course, used it, but he seems to have relied more upon the old quadrant which he had used for long years before Behaim invented his adaptation of the astrolabe. It was this instrument, the value of which received such warm testimony from Diogo Gomez, one of Prince Henry's navigators; and it was larger and easier to handle than the astrolabe. But the difficulty, as regards both these instruments,* was the necessity for keeping them perpendicular to the horizon when the observation is taken, in one case by means of a ring working freely, and in the other by a plummet line. The instruction of old Martin Cortes was to sit down with your back against the mainmast: but in reality the only man who obtained results of any use from such instruments was he who had been constantly working with them from early boyhood. In those days, far more than now, a good pilot had to be brought up at

* The cross-staff had not then come into use, and it was never of much service in low latitudes.

sea from his youth. Long habit could alone make up, to a partial extent, for defective means.

Columbus regularly observed for latitude when the weather rendered it possible, and he occasionally attempted to find the longitude by observing eclipses of the moon with the aid of tables calculated by old Regiomontanus, whose declination tables also enabled the admiral to work out his meridian altitudes. But the explorer's main reliance was on the skill and care with which he calculated his dead reckoning, watching every sign offered by sea and sky by day and night, allowing for currents, for leeway, for every cause that could affect the movement of his ship, noting with infinite pains the bearings and the variation of his compass, and constantly recording all phenomena on his card and in his journal. Columbus was the true father of what we call proper pilotage.

It is most interesting to watch the consequences of this seaman-like and most conscientious care in the results of his voyages of discovery. We have seen with what accuracy he made his landfall at the Azores, on his return from his first and most memorable voyage. The incidents of his second voyage are equally instructive. He had heard from the natives of the eastern end of Española that there were numerous islands to the south-east inhabited by savage tribes of Caribs, and when he sailed from Spain on his second voyage he resolved to ascertain the truth of the report before proceeding to his settlement at Navidad. He shaped such a course as to hit upon Dominica, and within a few weeks he discovered the whole of the Windward Islands thence to Puerto Rico. On his return his spirit of investigation led him to try the possibility of making a passage in the teeth of the trade wind. It was a long voyage, and his people were reduced to the last extremity, even threatening to eat the Indians who were on board. One night, to the surprise of all the company, the admiral gave the order to shorten sail. Next morning, at dawn, Cape St. Vincent was in sight. This is a remarkable proof of the care with which his reckoning must have been kept, and of his consummate skill as a navigator. On his third voyage he decided, for various reasons, to make further discoveries nearer to the Equator, the result of his decision being the exploration of the Gulf of Paria, including the coast of Trinidad and of the continent. His speculations, although sometimes fantastic, and originating in a too vivid imagination, were usually shrewd and carefully thought out. Thus they led from one discovery to another; and even when, through want of complete knowledge, there was a flaw in the chain of his reasoning, the results were equally valuable.

A memorable example of an able and acute train of thought based on observations at sea, was that which led to his last voyage in search of a strait. He had watched the Gulf Stream constantly flowing in a westerly direction, and he thought that he had ascertained, as the

result of careful observation, that the islands in the course of the current had their lengths east and west, owing to erosion on their north and south sides. From this fact he deduced the constancy of the current. His own pilot, Juan de la Cosa, serving under Ojeda and Bastidas, had established the continuity of land from the Gulf of Paria to Darien. The admiral himself had explored the coast of Cuba both on the north and south sides for so great a distance that he concluded it must surely be a promontory connected with the continent. The conclusion was that, as it could not turn to north or south, this current, ever flowing in one direction, must pass through a strait. The argument was perfectly sound except in one point—the continental character of Cuba was an hypothesis, not an ascertained fact.

Still, it was a brilliant chain of reasoning, and it led to a great result, though not to the expected result. Just as the search for the philosopher's stone led to valuable discoveries in chemistry, and as the search for El Dorado revealed the courses of the two largest rivers in South America, so the admiral's heroic effort to discover a strait in the face of appalling difficulties, in advancing years, and failing health, made known the coast of the continent from Honduras to Darien.

All the discoveries made by others in the lifetime of Columbus on the coasts of the western continent (except that of Cabral), were directly due to the first voyage of the admiral, to his marvellous prevision in boldly sailing westward across the sea of darkness, and are to be classed as Columbian discoveries. This was clearly laid down by Las Casas, in a noble passage: "The admiral was the first to open the gates of that ocean which had been closed for so many thousands of years before," exclaimed the good bishop. "He it was who gave the light by which all others might see how to discover. It cannot be denied to the admiral, except with great injustice, that as he was the first discoverer of those Indies, so he was really of all the mainland; and to him the credit is due. For it was he that put the thread into the hands of the rest by which they found the clue to more distant parts. It was not necessary for this that he should personally visit every part, any more than it is necessary to do so in taking possession of an estate; as the jurists hold." This generous protest by Las Casas should receive the assent of all geographers. The pupils and followers of Columbus, such as Pinzon, Ojeda, Niño, and La Cosa, discovered all the continent from 8° S. of the Equator to Darien, thus supplementing their great master's work; while he himself led the way, and showed the light both to the islands and to the continent.

Although none of the charts of Columbus have come down to us, there still exists a map of all discoveries up to the year 1500, drawn by the pilot Juan de la Cosa, who accompanied him in his first and second voyages, and sailed with Ojeda on a separate expedition in 1499, when the coast of the continent was explored from the Gulf of Paria to Cabo

de la Vela. Juan de la Cosa drew this famous map of the world (which is preserved at Madrid) at Santa Maria, in the Bay of Cadiz, when he returned from his expedition with Ojeda in 1500. It is drawn in colour, on ox-hide, and measures 5 feet 9 inches by 3 feet 2 inches. La Cosa shows the islands discovered by Columbus, but it is difficult to understand what he could have been thinking about in placing them north of the Tropic of Cancer. The continent is delineated from 8° south of the Equator to Cabo de la Vela, which was the extreme point to which discovery had reached in 1500; and over the undiscovered part to the west, which the admiral himself was destined to bring to the



knowledge of the world a few years afterwards, Juan de la Cosa painted a vignette of St. Christopher bearing the infant Christ across the ocean. But the most important part of the map is that on which the discoveries of John Cabot are shown, for this is the only map which shows them. It is true that a map, or a copy of a map, of 1542, by Sebastian Cabot, was discovered of late years, and is now at Paris, and that it indicates the "Prima Vista," the first land seen by Cabot on his voyage of 1497; but it shows the later work of Jacques Cartier and other explorers, and does not show what part was due to Cabot. Juan de la Cosa, however, must have received, through the Spanish Ambassador in London, the

original chart of Cabot showing his discoveries during his second voyage in 1498, and was enabled thus to include the new coast-line on his great map.

The two voyages of John Cabot were inspired by the achievement of Columbus. Cabot had been to Spain, he had imbibed all the admiral's notions about Zipangu and the empire of the Grand Khan before he came to England with his proposals, looking upon the work of Columbus "as a thing more divine than human," as his son Sebastian expressed it.

Emulation of Columbus equally inspired the Portuguese expeditions of Cortereal, which sailed to the westward in 1501 and 1502. In the first year Cortereal sighted Greenland, and examined the west coast of Newfoundland. In the second he shaped a more westerly course, reaching the New World in about the latitude of Lisbon—Chesapeake, or Delaware Bay—and following the coast as far as Cape Breton for 600 miles. There he attempted to reach the discoveries of his first voyage, was lost in ice or fog, and his vessel was never heard of again. But his two consorts returned to Lisbon with the news. It happened that an Italian named Alberto Cantino was then living at Lisbon, who was a correspondent of the Duke of Ferrara; and he employed a Portuguese draughtsman to prepare a map of the world for the duke, with a view to showing the discoveries of Cortereal. This map is still preserved at Modena. The draughtsman obtained the cards of Cortereal's pilots, and placed the two new coast-lines on his map, namely, the west coast of Newfoundland, and the coast from Chesapeake Bay to Cape Breton. This work was used by Ruysch in 1508, and in the Ptolemy of 1513, and it has given rise to much controversy; but the matter, though very interesting to students of cartography, could only be discussed in a note to this paper.* The same remark applies to the vexed question of the alleged first voyage of Amerigo Vespucci.†

This rapid review is sufficient to remind us of the extent of the work of discovery between 1492 and 1506, which was due to the genius and to the courageous initiative of Columbus. The gigantic labour wore out his body. But his mind was as active as ever. He had planned an attempt to recover the Holy Sepulchre. He had thought out a scheme for an Arctic Expedition, including a plan for reaching the North Pole, which he deposited in the monastery of Mejerada. It was not to be. When he returned from his last voyage, he came home to die. We gather some idea of the admiral's personal appearance from the descriptions of Las Casas and Oviedo. He was a man of middle height, with courteous manners and noble bearing. His face was oval, with a pleasing expression, the nose aquiline, the eyes blue, and the complexion fair and inclined to ruddiness. The hair was red,

* Note on Cortereal (and the Cantino map)

† Note on the alleged first voyage of Vespucci.

though it became grey soon after he was thirty. Only one authentic portrait of Columbus is known to have been painted. The Italian historian, Paulus Jovius, who was his contemporary, collected a gallery of portraits of worthies of his time at his villa on the Lake of Como. Among them was a portrait of the admiral. There is an early engraving from it, and very indifferent copies in the Uffizi at Florence, and at Madrid. But until quite recently I do not think that the original was known to exist. It, however, never left the family, and when the last Giovio died it was inherited by her grandson, the Nobile de Orché, who is the present possessor. I was so fortunate as to see it when I was at Como, and also to obtain a photograph of it. Here we have the head of a venerable man, with thin grey hair, the forehead high, the eyes pensive and rather melancholy. It was thus that he doubtless appeared during the period that he was in Spain, after his return in chains, or during the last year of his life.

In his latter years we see Columbus, although as full as ever of his great mission, thinking more and more of the transmission of his rights and his property intact to his children. He had always loved his home, and his amiable and affectionate disposition made many and lasting friendships in all ranks of life, from Queen Isabella and Archbishop Doza to the humblest *grumete*. We find his shipmates serving with him over and over again. Terreros, the admiral's steward, and Salcedo, his servant, were with him in his first voyage and in his last. His faithful captains, Mendez and Fieschi, risked life and limb for him, and attended him on his death-bed. Columbus was also blessed with two loving and devoted brothers. In one of his letters to his son Diego, he said: "Never have I found better friends, on my right hand and on my left, than my brothers." Bartholomew especially was his trusty and gallant defender and councillor in his darkest hours of difficulty and distress, his nurse in sickness, and his helpful companion in health. The enduring affection of these two brothers from the cradle to the grave is most touching. Columbus was happy too in his handsome promising young sons, who were ever dutiful, and whose welfare was his fondest care; they fulfilled all his hopes. One recovered the admiral's rights, while the other studied his father's professional work, preserved his memorials, and wrote his life. Columbus never forgot his old home at Genoa, and the most precious treasures of the proud city are the documents which her illustrious son confided to her charge, and the letters in which he expressed his affection for his native town. Columbus was a man to reverence, but he was still more a man to love.

The great discoverer's genius was a gift which is only produced once in an age, and it is that which has given rise to the enthusiastic celebration of the fourth centenary of his achievement. To geographers and sailors the careful study of his life will always be useful and instructive. They will be led to ponder over the deep sense of duty and responsibility

which produced his unceasing and untiring watchfulness when at sea, over the long training which could alone produce so consummate a navigator, and over that perseverance and capacity for taking trouble which we should all not only admire but strive to imitate. I cannot better conclude this very inadequate attempt to do justice to a great subject than by quoting the words of a geographer whose loss from among us we still continue to feel—the late Sir Henry Yule. He said of Columbus: "His genius and lofty enthusiasm, his ardent and justified provisions, mark the great admiral as one of the lights of the human race."*

NOTE I.—*Cortereal, and the New Coast Lines on the Cantino Map.*

THE two voyages of discovery despatched from Lisbon under Gaspar Cortereal, in 1500 and 1501, deserve more attention than they have hitherto received. The first voyage was directed to the north, but there are only very meagre accounts of it in the chronicle of Damian de Goes and in Galvano. Leaving Lisbon or Terceira, it is not quite clear which, in the summer of 1500, Cortereal steered north until he sighted the south coast of Greenland. He met with many icebergs and found fresh water on them, where the ice was melted by the sun. He coasted along the whole eastern side of Newfoundland, calling it "Terra Verde," because the land was covered with trees suitable for making masts. Cortereal returned with several natives, and, according to a legend on a Portuguese *portolano* of the sixteenth century, referred to by Mr. Harriase, some polar bears.

In the following year a second expedition was fitted out. Cortereal signed a receipt for biscuits on April 25th, 1501, and sailed a few days afterwards, probably on the last day of April. We obtain some particulars respecting the second voyage of Cortereal from the accounts of two Italian letter writers who were then at Lisbon, Pietro Pasqualigo and Alberto Cantino; but they confuse events of the two voyages, and are not very clear. The latter was a correspondent of the Duke of Ferrara. It appears that Cortereal steered west on his second voyage, and reached a coast which had that bearing from Lisbon, where there were delicious fruits of various kinds. This would be about the Bay of Chesapeake. He coasted along the land northwards for 600 miles, passing several great rivers, which would have brought him to Cape Breton. Here there was much fish. While two of his vessels returned home in October, 1501, Cortereal himself wished to reach the land he discovered in his first voyage. He pushed out into the fog and ice, and was never heard of again. Several relics of the expedition of Cabot were found, showing that Cortereal went over ground previously visited by the English in 1498.

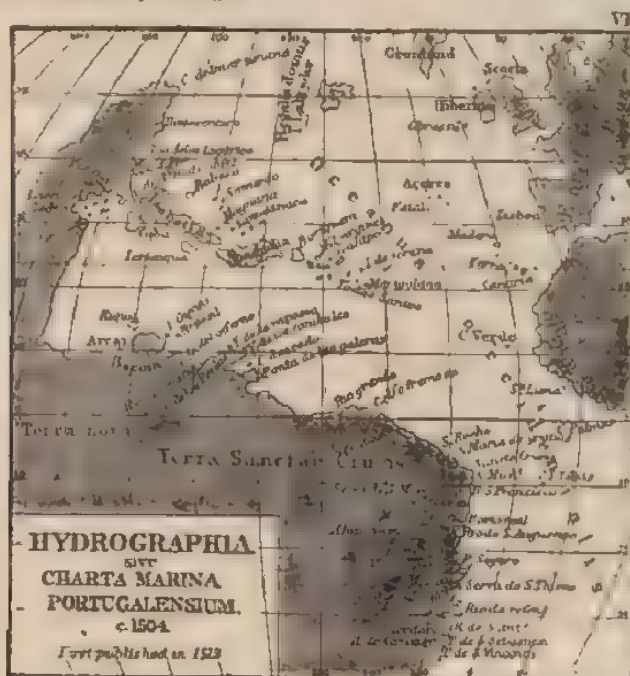
Cantino caused a map of the world to be prepared at Lisbon by a Portuguese draughtsman for the Duke of Ferrara, which was to show the discoveries of Cortereal. It is still preserved at Modena, and a facsimile has been published by Mr. Harriase.

The interest attaching to the Cantino map arises from two coast-lines being shown upon it for the first time; and as the map was drawn to show the discoveries of Cortereal, these coast-lines ought to be taken as representing Cortereal's discoveries, unless good reasons can be shown to the contrary. The results of the first voyage are shown by the southern point of Greenland, and by a line, much broken

* 'Marco Polo' Intr., l., 102.

by inlets, representing the east coast of Newfoundland. It is called "Terre del Rey de Portugall," and there is a legend to the effect that it was discovered by Gaspar de Cortereal, who was lost when the other ships returned. A forest of tall trees is painted on the land. The newly-discovered coast is placed just to the eastward of the meridian drawn to show the Papal dividing line between the regions granted to Spain and Portugal, which amounts to moving Newfoundland 300 miles to the east, in Portuguese interests.

The results of the second voyage of Cortereal are shown on the Cantino map by a coast-line bearing west from Portugal, and extending for 600 miles in accordance with the accounts in the letters of Pasqualigo and Cantino. Here there is no territory-claiming legend, no doubt because the coast was so far to the west that it could not be claimed by Portugal.



[This is identical with the Cantino map.]

This coast-line has given rise to much conjecture, because people insist upon going far afield to explain it, when the natural explanation is close at hand. As the draughtsman was employed to show the discoveries of Cortereal, the most natural supposition is that he applied to the pilots of the returned ships for the cards on which they had plotted their work. He received a rude chart with a coast-line on which there were twenty-two Portuguese names of rivers and capes. A few were unintelligible, doubtless owing to the paper being chafed or blotted. The most southern point is near the latitude of Lisbon, and answers to the entrance of the Gulf of Chesapeake, with the islands on the east side. There is a river of palms, and a river of lizards, but of course it would be waste of time to attempt to account for the caprices of sailors in naming places as they pass them. There is, however, one name—O. do fim do Abrill—which may have been given in memory of the day on which the expedition left Lisbon.

Mr. Harrisse, who published the facsimile of the Cantino map, contended that this coast-line could not be intended to represent Cortereal's discoveries, because that explorer could never have committed the blunder of leaving such an immense space between Newfoundland and the North American coast. But Cortereal was dead, and was not responsible in any conceivable way for anything on the map. The cards of his pilots were placed in the hands of Cantino's draughtsman, and he alone was responsible for the positions of the coast-lines when he transferred them to his map of the world. He placed Newfoundland much too far to the east, for obvious political reasons. He placed the North American coast too far west, probably because he thought it must be placed west of Cuba; and he further increased the distance from Newfoundland by making it trend north and south. These were mistakes of the draughtsman, not of Cortereal or his pilots. His worst mistake was in placing Cuba and Española too far north, and far to the north of the tropic; but in this he only followed Juan de la Cosa. The position of Cuba, with reference to the south end of the new coast-line, has led writers, who are not used to the examination of maps, to think that the promontory in the latitude of Lisbon, at the south end of the coast-line, must be intended for Florida.]

Rayach, whose map of the world appeared in 1508, must have been furnished with a copy of the Cortereal coast-line, but he made a very strange use of it. He placed it in the position of Cuba, omitting that island altogether. Hence, some recent critics have adopted the theory that the coast-line on the Cantino map was nothing more than the Cuba coast turned the wrong way! On the map of the world in the Ptolemy of 1513 this part of the map of Cantino's draughtsman is followed pretty closely. The most remarkable theory of all is, that the coast-line on the Cantino map was intended to represent a portion of the imaginary discoveries of Vespucci during his apocryphal first voyage, of course omitting Laria and Iti, the only names given by Vespucci.

These wonderful speculations appear to be out of place. The map was intended to show the discoveries of Cortereal, and it is most unreasonable to suppose, without good reason, that the coast-lines are intended to show anything else. They agree well with the accounts of those discoveries; and the more western coast-line is particularly interesting because it is the first detailed delineation of a great part of the coast of that region which afterwards became the United States.

NOTE II.—*Amerigo Vespucci, and his alleged First Voyage.*

AMERIGO VESPUCCI stated that he made a voyage in 1497-98, in which he discovered more than 870 leagues of new coast-line; and his commentators claim for him the first discovery of the whole vast region from Honduras, round the coasts of the Gulf of Mexico and of Florida, to Cape Hatteras, as well as of the island of Bermuda. If this is true it should be generally recognised, and if false it is high time that the imposture was exposed and finally disposed of.

The undisputed facts in the life of Vespucci are as follows. He was the third son of Nastagio Vespucci, a notary of Florence, where he was born on March 9th, 1451. He was admitted as a clerk into the great commercial house of the Medici, and in 1492 he was sent to Cadiz as a mercantile agent, apparently by the head of the house, Lorenzo di Pier Francesco di Medici. He afterwards became chief clerk to an Italian merchant at Seville, named Juanoto Berardi, who contracted for the supply of provisions to ships, and also undertook to furnish ships for the expeditions to the Indies. In April, 1493, Berardi signed a contract to build twelve vessels for the Government, delivering the first four in April, the next four in June, and the rest in September. Four of these vessels were sent to Española with Agúda, four

were lost at sea, and the last four appear to have been used for the third voyage of Columbus. Berardi also contracted for provisioning the ships for the second voyage.

On the death of Berardi, in December, 1495, Vespucci undertook to complete his contracts; and he became a provision merchant on his own account. He was busily engaged in this business at Seville and San Lucar until May, 1498. But in the following year he embarked in the expedition of Alonzo de Ojeda, who was sent by Ponce de Leon to follow up the discoveries of the admiral on the pearl coast. Ojeda said, in his evidence, that he took with him "Juan de la Cosa, the pilot, Morigo Vespuche, and other pilots."* The words "and other pilots" must have been intended to be coupled with Juan de la Cosa the pilot, not with Vespucci. For the Florentine contractor, who went to sea for the first time at the mature age of 48, could never have been a sailor, much less a pilot. In those days, even more than now, it was necessary for a navigator to have been brought up to a sea-faring life from a boy. Vespucci probably went as a volunteer, or as a merchant who had contributed towards the expenses of the voyage, as Las Casas supposed. It has been said that he had studied astronomy and navigation; but there is no sufficient evidence in support of the statement.

The expedition of Ojeda sailed in May, 1499, and made a bad landfall, sighting land somewhere on the coast of Guiana. The vessels entered the Gulf of Paria, and explored the country as far as Cabo de la Vela. The principal incidents in the voyage were the search for pearls, the discovery of a large village built on piles, which was named *Venezuela*, or Little Venice; the refitting in a very fine harbour—probably the Gulf of Carinco, near Cumana; an encounter with natives, when one Spaniard was killed and twenty-two wounded; the unwelcome visit to Española and transactions with Roldan; and the return with a cargo of slaves. Ojeda returned to Cadix in June, 1500.

In the following year Vespucci went to Lisbon, and remained in Portugal for four years. In 1505 he returned to Spain, visiting Columbus at Seville, who spoke of him, in a letter to his son, as one "who always showed a desire to please me, and he is a very respectable man. Fortune has been adverse to him, as to many others, and his labours have not been so profitable as he might reasonably have expected." From this it would seem that he went to Portugal with the object of profit. He failed there; but was well received by King Ferdinand on his return to Spain, who probably thought that his knowledge of Portuguese policy would be useful. Vespucci again obtained contracts for the supply of provisions for ships, and in 1506 there was an intention of sending an expedition, under Pinzon and Vespucci, in search of a route to the Spice Islands by the west; but it was abandoned. On March 22nd, 1508, Vespucci was appointed Pilot-Major of Spain—certainly a strange selection with such men as La Cosa, Pinzon, and Solis to select from, even if the clever and plausible Florentine had picked up some theoretical knowledge of nautical matters. No man could become a practical navigator who went to sea for the first time in advanced middle-life. The appointment may, perhaps, be explained from political motives, and on account of the services Vespucci could render through his supposed knowledge of the Portuguese king's views and intentions.†

* Navarrete, *iii*, 514.

† The letter of Vianello, dated December 23rd, 1508, in which it is stated that Juan the Biscayan, and Amerigo the Florentine, had returned from a voyage of discovery, was clearly written under a misapprehension. The correspondent of the Signetory of Venice must have been misinformed as to the names, for Vespucci was in Spain in the end of August, and he cannot have made a voyage of discovery, and have returned between August and December.

Vespucci died at Seville on February 22nd, 1512. He married a Spaniard named Maria Cerezo, but left no children, for on her death, in 1524, her pension of 10,000 maravedis was passed on to her sister Catalina.* A nephew, named Juan Vespucci, was appointed a pilot on May 22nd, 1512, but was dismissed, owing to bad conduct, in March, 1525.†

The accounts of his alleged voyages, which have made Vespucci so notorious, are contained in two letters written from Lisbon. The first, dated in March, 1504, and addressed to Lorenzo di Pier Francesco di Medici, describes what Vespucci called his third voyage along the coast of Brazil. The second letter, dated September 4th, 1504, contains the narrative of his four voyages. A French version of this letter was sent to René II., Duke of Lorraine, translated into Latin, and published in April, 1507. There is also an Italian version of extreme rarity,‡ with no date and no place of printing, but apparently contemporary with the Latin version. The original does not exist. The Latin version is addressed to Duke René, and the Italian version to a "magnificent lord." Pietro Soderini, Gonfaloniere of Florence in 1504, is supposed to be intended. The late F. A. de Varnhagen, Baron of Porto Seguro, did good service by reprinting both the Latin and Italian versions in his work on 'Amerigo Vespucci,' in 1865.

Vespucci's account of his alleged first voyage is briefly as follows. He says that he went to Spain to engage in mercantile pursuits, but that after some years he resolved to see the world and its marvels. King Ferdinand having ordered four ships to go forth and make discoveries to the westward, Vespucci was chosen by His Highness to go in the fleet, to assist in the work of discovery. They sailed from Cadiz on May 10th, 1497, and reached Grand Canary, which, he says, is in 27° 30' N., and 280 leagues from Lisbon. There they remained eight days, and then sailed for thirty-seven (twenty-seven, Latin version) days on a W.S.W. course (*Ponente pigliando una quarta di libeccio*), reaching land when they were nearly 1000 leagues from Grand Canary. For they found, by their instruments, that they were in 16° N. lat. and 75° W. long. Vespucci then gives a long account of the natives. After some days they came to a village built over the water, like Venice, about forty-four houses resting on very thick poles. Sailing along the land for 80 leagues, they came to another people, speaking a different language, where Vespucci saw an iguana being roasted, which he describes. He made an excursion inland for 18 leagues, and found the country very populous. This place was on the Tropic of Cancer, where the latitude is 23° N. The province is called *Parías* (Latin version), *Lariab* (Italian version). Thence they sailed, always in sight of the land, on a N.W. course (*verso el maestro*) for 870 leagues, having intercourse with many tribes, and finding some gold.

When they had been absent thirteen months the ships began to leak, and required caulking, so they entered the best harbour in the world, where there were many friendly people. Here they refitted, and remained for thirty-seven days. They then sailed eastward for seven days, and came to some islands 100 leagues off the mainland, inhabited by fierce people called *Iti*. They had encounters with the natives, when one of their men was killed and twenty-two were wounded. They then sailed for Spain with 222 slaves, arriving at Cadiz on October 15th, 1498, where they sold their slaves, and were well received.

This is the story of Vespucci. It has been considered to be a fabrication from

* Navarrete, iii., p. 324.

† 'Cartas de Indias,' p. 865.

‡ Four copies are known to exist. Varnhagen thought that this Italian version was printed at Pescia in 1506.

that time to this, for the following reasons. Vespucci was at Seville or San Lucar, as a provision merchant, from the middle of April, 1497, to the end of May, 1498, as is shown by the official records, examined by Muñoz, of expenses incurred in fitting out the ships for western expeditions. Moreover, no expedition for discovery was despatched by order of King Ferdinand in 1497; and there is no allusion to any such expedition in any contemporary record.

The internal evidence against the truth of the story is even stronger. Vespucci says that he sailed W.S.W. for nearly 1000 leagues from Grand Canary. This would have taken him to the Gulf of Paria, which is rather more than 600 leagues W.S.W. from Grand Canary. It would never have taken him near the land at 16° N. Even with a course direct for that point, instead of a W.S.W. course, and disregarding intervening land, the distance he gives would leave him 930 miles short of the alleged position. No actual navigator would have made such a blunder. He evidently quoted the dead reckoning from Ojeda's voyage, and invented the latitude at random. It is useless for the defenders of Vespucci to refer to the faulty reckonings of those days, and to pilots thinking they were near the Canaries when they were off the Azores. This is a different matter. It is the case of a man alleging that he has fixed his position by observations, and giving a dead reckoning nearly a thousand miles out, in the belief that it would bring him to the same point. It is fudging, but the fudging of a man ignorant of a pilot's business. His statement that he went N.W. for 870 leagues (2610 miles) from a position in latitude 23° N., is still more preposterous. Such a course and distance would have taken him right across the continent to somewhere in British Columbia.

The chief incidents in the voyage are those of the Ojeda voyage in 1499. There is the village built on piles called Little Venice. There is the best harbour in the world, which was the Gulf of Cariaco, where Ojeda refitted.* There was the encounter with natives, in which one Spaniard was killed and 22 were wounded. These numbers are convincing evidence. The figures were given to Roldan by Ojeda's men, and Las Casas himself saw Roldan's letter containing them.† Vespucci gives the identical numbers as the casualties in an encounter during his alleged voyage! Ojeda's voyage terminated with a capture of slaves. Vespucci's voyage terminated in the same way; but the number of 222 is absurd. The ships could not possibly have carried so many. So that there is cumulative evidence that Vespucci borrowed the chief incidents from the voyage of Ojeda, in which he served, to make up an earlier imaginary voyage. There is nothing in his narrative, except the impossible positions, bearings, and distances, which might not have happened in the Ojeda voyage. Of course these incidents had to be omitted in the account of Vespucci's alleged second voyage (Ojeda's voyage), which would make it very short and colourless; and this is actually the case. It contains very little beyond some incorrect dates.

Vespucci does not mention the commanders of the expedition, nor any Spanish name whatever, and only gives two names of places, namely, *Paria* or *Lariab*, and *Iti*, both imaginary.

Humboldt was aware of the proofs that Vespucci could not have been absent from Spain in 1497-98, and that the incidents of his alleged first voyage belonged to that of Ojeda; but he was reluctant to believe in actual fraud. He therefore suggested that there were misprints with regard to the dates; that the first voyage of Vespucci was that of Ojeda; and that the Florentine merchant returned home from Española in time to join the voyage of Pinzon in 1500, which was the second voyage. But no one was allowed to land from Ojeda's ships at Española, and the

* Las Casas, i, 411.

† Las Casas, i, 392.

dates are too detailed, and occur too clearly in both versions, to admit of the wholesale alterations demanded by this theory.

The Baron Varnhagen, in his defence of Vespucci, published in 1865 at Lima, and in 1869 at Vienna, takes a bolder course. He adopts the whole of the statements of Vespucci as perfectly true, including the dates; but his defence does not amount to much. He was evidently unaware of the extent of the error in Vespucci's reckoning, and did not realise the inevitable inference. He got over the Little Venice difficulty by suggesting that there were many other villages built on piles, and that there might have been one on the coast of Tabasco. That is true. There was also the old Quebec hotel in Portsmouth Harbour; but this is not the point, and he failed to see where the difficulty lies. The Little Venice was a discovery in Ojeda's voyage when Vespucci was present. Its recurrence here, and its omission in the version of Ojeda's voyage by Vespucci, are the suspicious points which Varnhagen fails to explain away. Of the words *Parias* and *Lariab* in the two versions, Varnhagen prefers the latter. It is quite impossible to tell which form, or whether either, was in the original manuscript. Although there is no such place as *Lariab*, yet a Mexican author, named Orzco, said that some of the names of places near Tampico, where the Huasteca language is spoken, ended in *ab*. This is a point, so far as it goes—which is not very far. Even the voyage of 870 leagues N.W. from lat. 23°, does not daunt the Baron. He ignores Vespucci's course, and takes him a marvellous voyage round the shores of the Gulf of Mexico and the peninsula of Florida, to Cape Hatteras, where he certainly does not find the best harbour in the world. Thence Vespucci is taken to Bermuda, identified as *Iti*, and so home. It is well known that Bermuda was uninhabited before its settlement by Europeans, and that there were no signs of previous inhabitants; while the *Iti* of Vespucci was densely peopled with fierce savages. But this is ignored by Varnhagen. It would certainly have been a most extraordinary voyage, and it is still more extraordinary, that though the secret must have been known to many people at the time, it should have been inviolably kept without any object in such secrecy, and that the discoveries should have appeared on no map and in no narrative. Yet Vespucci's story, though a bold flight, bears no comparison with the grandeur of Varnhagen's conception of it.

It was seen, however, that thorough as was this interpretation of the Florentine's text, it could not be upheld unless an expedition with a genuine commander could be found to take the discoverer in 1497; for Vespucci modestly admitted that he was not in command of the expedition, but was only sent by the king to assist. Vicente Yanez Pinzon and Juan Diaz de Solis, as was hitherto believed, undertook a voyage, after the return of Columbus from his last expedition, to follow up his discoveries, sailing in 1508, and exploring the Gulf of Honduras and the coasts of Yucatan. Baron Varnhagen selected this expedition for the use of Vespucci, and adduced the following argument to show that Pinzon and Solis sailed in 1497, and not in 1508.

Oviedo, in his 'History of the Indies,' wrote that the pilots Vicente Yanez Pinzon, Juan Diaz de Solis, and Pedro de Ledesma, with three caravels (Vespucci said that the expedition, in which he sailed, consisted of four caravels), discovered the Honduras coast before Pinzon was off the mouth of the Amazon, therefore in 1498; and Gomara has a similar insinuation. "But some say that Pinzon and Solis had been on the Honduras coast three years before Columbus." Both these authors were unscrupulous, and took every opportunity to detract from the merits of the admiral, as in the fiction of the pilot who was alleged to have visited the Indies before him. In this instance Oviedo is detected by his mention of Ledesma. This young native of Seville was twenty-seven when he sailed in the last

expedition of Columbus. If he had sailed with Pinzon six years before, he would have been a lad of twenty-one. It is not to be believed that he was then in a position to have his name coupled with those of Pinzon and Solis as a pilot and captain of a caravel. Ledesma certainly did go with them in 1506 as a pilot, he being then over thirty, and having served on the same coast under the admiral. This mention of Ledesma defeats the object of Oviedo to mislead. Gomara only ventures upon an insinuation; but it is clearly false, for "three years before" Pinzon was engaged on a voyage in quite a different direction. It is further argued that the only authority who gives an account of the voyage of Pinzon and Solis, and places it after the last voyage of Columbus, is Herrera; that Herrera was not a contemporary, but lived a century after the time; and that he is careless and inaccurate. An attempt is also made to prove that Pinzon could not have made a voyage in 1506, because he can be shown, from documents in the collection of Navarrete, to have been in Spain during 1505, and in August, 1506.

The statement about Herrera is erroneous. He is not the only authority for the time of Pinzon's voyage. In fact, he merely copied the narrative of Las Casas word for word. The authority is Las Casas,* a contemporary with full and complete knowledge, who was personally acquainted with Pinzon and Ledesma, and whose truthfulness and accuracy cannot be impeached. Las Casas says that after the admiral left Jamaica and returned to Spain, it being known what he had achieved, Pinzon and Solis agreed together to make a voyage with the object of following up his discoveries, commencing at the island of Guanaja. He then gives an account of the voyage, which is much the same as was recorded in the lawsuit of Diego Columbus, when Pinzon, Ledesma, and Bastidas gave evidence on the subject. The statement of Rodrigo Bastidas,† whose personal knowledge was even more thorough than that of Las Casas, is most important. He affirmed that the work shown on the chart of Pinzon and Solis was all one coast with that which the admiral discovered *first*. He said this in the very presence of Pinzon and Ledesma, without contradiction, or fear of contradiction. No serious writer can affirm that Pinzon and Solis were on that coast before the admiral, in the face of the statement of Las Casas and the sworn testimony of Bastidas.

The documents printed by Navarrete show that Pinzon was in Spain during the year 1505.‡ The king intended to have sent Pinzon and Vespucci in search of the Spice Islands by the west, and they were ordered to be consulted on the subject on August 23rd, 1506.§ But soon afterwards the intention of sending such an expedition was abandoned,|| and Pinzon and Solis were then free to follow up the admiral's discoveries. They must have sailed in November, 1506; for they appear to have reached the Bay of Honduras at Christmas, naming it the great bay of "Navidad." After exploring the coast of Yucatan, they returned in 1507;¶ and in June, 1508, they were despatched on another expedition along the coast of Brazil.**

This settles the question of the date of the voyage of Pinzon and Solis. There was no expedition in 1497 with which Vespucci could have sailed.

* Lib. ii, cap. xxxix.

† Navarrete, iii, p. 358. Bastidas was the navigator who, with Juan de la Cosa, discovered the coast from Cabo de la Vela to Darien in 1500. Las Casas speaks of him as a loyal, honourable man.

‡ Navarrete, iii, 112, 204.

§ *Ibid.*, iii, p. 294.

|| *Ibid.*, iii, p. 321.

¶ Pinzon was buying arms, powder, and stores in 1507, apparently towards the end of that year.—Navarrete, iii, 322.

** Navarrete, iii, p. 47.

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There are several other circumstances which combine to prove that the first voyage of Vespucci was never made. In the lawsuit between the Crown and Diego Columbus, the royal "Fiscal" exerted himself to collect proofs that some discoveries were not made by the admiral, but by other navigators. If Vespucci was in an expedition which discovered thousands of miles of new coast-line, and which was despatched by the king's order, there must have been an official report, which would inevitably have been produced at the trial, and confirmed by Pinzon, Solis, and Ledesma. But those navigators merely claimed to have explored the coast of Yucatan. At least one copy of the letter of Vespucci, which was printed in 1507, had reached Spain when the lawsuit was in progress, for Fernando Columbus bought one at Rome and brought it to Seville in 1513. Vespucci was dead, but if the first voyage had not been known to be a fabrication, the letter would have been eagerly brought forward as evidence of extensive discoveries not made by the admiral. Then there is the negative evidence of maps. Juan de la Cosa drew his famous map of the world in 1500, after serving in the voyage of Ojeda in company with Vespucci. He placed flags on the discovered parts, and one on each of the furthest known points. There is a Spanish flag at Cabo de la Vela, the extreme point then known in South America, another at the extreme point reached by Columbus on the north coast of Cuba, and an English flag at the extreme point reached by Cabot. A conjectural line runs round from the last English to the first Spanish flag, and there is no sign of the alleged Vespucci discoveries. If it is suggested that the Florentine himself kept them secret, without any conceivable object in doing so, there were all his companions to proclaim them, and there was the official report. The Cabot discoveries on Cosa's map show that he was supplied with all information possessed by the government. Next, there is the map prepared for Peter Martyr's book in 1511. Here Bermuda appears for the first time, but there is no sign of *Iti*, or of any of the alleged Vespucci discoveries, although Vespucci was then chief pilot, and his nephew was intimate with Peter Martyr. Even stronger evidence against Vespucci is supplied by the concession made to Ponce de Leon in 1511. It was a concession for the discovery of that very coast of Florida which is alleged to have been first discovered by Vespucci in 1497-98, and the concession was made on condition that the coast had not been discovered before. It is incredible that Pinzon, Solis, Ledesma, and Vespucci—who was then chief pilot—should all have combined to keep silence without any conceivable reason; and still more incredible that the king should have made such a condition if it was true that the discovery had been made years ago by an expedition despatched by himself.

The evidence against Vespucci is cumulative and quite conclusive. His first voyage was a fabrication. There is no reason to think that he concocted the story with any idea of robbing Columbus of any part of his fame; still less that he connived at the suggestion of the name America. It is very unlikely that he ever heard of the suggestion of Waldseemüller. Vespucci merely wrote to interest his friends at Florence, seeking for credit at home by magnifying his exploits, as many another has done before and since. He can have had no other object, nor could he have foreseen the notoriety his letters acquired.

After the reading of Mr. Markham's paper, the following discussion took place:—

HIS EXCELLENCY THE SPANISH AMBASSADOR: I hope you will allow me to thank you for the kind words you have pronounced. This is to me a most attractive subject, and I am extremely grateful for the paper, and equally grateful to those here who have received it in such a sympathetic way.

Admiral Sir ERASMUS OMMANEY: It would be unbecoming of me if I did not

rise to express my admiration of the paper which Mr. Markham has just read to us. You should know that he served under my command as a midshipman on board H.M.S. *Assistance*, in search of Franklin's missing expedition in the Arctic regions, when I discovered the first traces ever found of those ill-fated ships; therefore it is especially interesting to me to be present on this occasion, when he is recounting the discovery of America by Columbus, because we have travelled together over lands in the extreme north of America never before trod by any European. Our expedition and discoveries occurred during 1850-51. Markham was then a youth of great promise and intelligence, combined with a taste for following literary pursuits. I therefore beg to congratulate him on his excellent paper, and the Society on thus obtaining so much fresh information respecting the illustrious discoverer of the so-called New World.

The PRESIDENT: It would have been a very great omission on the part of the Royal Geographical Society if some friendly and sympathetic words had not been said before we parted this summer with reference to the greatest of navigators, the fourth centenary of whose great discovery will be celebrated this year in two allied and friendly countries; and it is most fortunate that the post of protagonist upon this occasion should have fallen to Mr. Markham. During a long life he has in many places and in many ways proved himself to be a firm friend of Geography. Everything that he has done he has done well, and you will, I am persuaded, lay upon me your commands to give to Mr. Markham your most sincere and grateful thanks.

Exploration in Sikkim: to the North-East of Kanchinjinga.

A VERY interesting expedition to the north-eastern base of Kanchinjinga was made in July, 1891, by Mr. C. White, British Resident at the Court of Sikkim, and Mr. Hoffman, of the firm of Johnston and Hoffman whose Himalayan photographs are well known in India.

The travellers followed as far as Tumlong the established pony track, made by the British troops at the time of the late war. Thence five days' march on foot over execrable mountain paths brought the party to the Talung monastery, lying in a valley, which is connected with Jongri, south of Kanchinjinga, by the Guicha La.

Turning north up a tributary valley, the travellers proceeded over the Youmtso La* to the Zemu Valley, the head of which is closed by the north-eastern, and probably the greatest, glacier of the Kanchinjinga group. Sir J. D. Hooker visited the lower portion of this valley, but failed to reach its glacier.† At the head of the Thlonok, a stream which

* According to information given to Sir J. Hooker in 1849, this route to Tibet had for many years previously been abandoned, from being so much more snowy and otherwise difficult than the routes by the Kongra Lama and Donkia Passes to the eastward.

† According to the information received by Sir J. Hooker in 1849, this Zemu River is his Thlonok, and vice versa. The point reached by Sir J. Hooker was a few miles short of the end of the glacier, which he was prevented from reaching by the valley being blocked with the preceding winter's snow, which in the month of June, when he was there, had not as yet melted. The sketch of the upper part of the valley (with Kanchinjinga at its head), given as the frontispiece to vol. ii. of Sir J. Hooker's '*Himalayan Journals*,' represents its condition at that season.

joins the Zemu from the N., lies the Jongsong La, crossed by the Pundit R. N. in his high-level tour of Kanchinjunga (see 'Report of Indian Surveys,' 1884-5, or 'Alpine Journal,' vol. xiii., p. 27). Mr. White and Mr. Hoffman, entering the Zemu Valley high up, were, it will be seen, able to visit and partially explore its glaciers, being the first Europeans to do so.

Several important deductions may be drawn from Mr. Hoffman's narrative, and they are confirmed by private letters received from Mr. White. He considers midsummer, despite the rains, the best season for high glacier exploration. He experienced in the middle of July intervals of fine clear weather. By the middle of September, when the settled fine weather begins, the flocks have already left the high valleys, and the cold is intense at great elevations. Mr. Hoffman's photographs show that there is possibly a route up the north-eastern slope of Kanchinjunga not steeper than that up Mont Blanc from Chamonix. Here too there is obviously a "Grand Plateau" at the base of the final crest. The Zemu Glacier has been proved to be only a fortnight's journey from Darjeeling. The Guicha La is only eight days from Darjeeling. Could the gap marked 19,300 feet on the survey map be crossed, the head of the Zemu Glacier might possibly be reached in two days more.

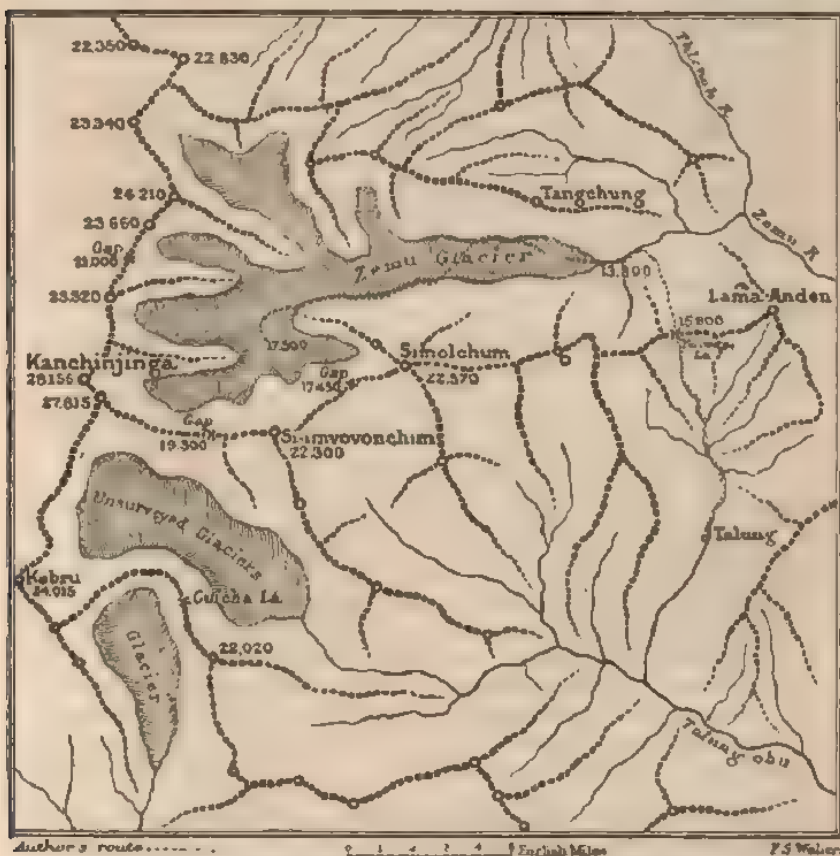
Mr. Hoffman proposes this season to pay a second visit to the snows, and he promises an account of his visit, and specimens of its photographic results. Any addition to our knowledge of this region, the neglect of which hitherto by the English at Darjeeling has been very singular, will be most welcome. It is to be hoped that the new views may include some extensive panoramas taken from high stations similar to those brought home from the Caucasus by Signor V. Sella. Such views are invaluable for topographic and cartographic purposes; but none have yet reached us from the Himalaya. A photographic camera forms part of the equipment of the mountain surveyors in Italy; but a system there developed has not yet apparently been brought into use in India. Meantime, the following extracts from Mr. Hoffman's narrative of the part of his 1891 journey which lay in hitherto unknown, or at any rate undescribed, country will be read with much interest by all lovers of mountains.

Talung is the limit of habitation on our line of tour. The village consists of about fifteen huts. It is prettily situated, and is surrounded by high mountains, the lower ridges of which are thickly wooded with pine forest. The people here had, up to the date of our visit, seen no Europeans except Mr. White and myself. Mr. White had been there in the previous year, and was the first European visitor to the Talung monastery.

We had to stay there for two days to recruit coolies and repack our kit, so as to make the loads lighter. We had to carry all necessaries, including commissariat, and even food for the coolies. Ahead of us was nothing but a howling wilderness—a *terra incognita*. We started our men early in the morning, and took care that

they were all in front of us. One of their little weaknesses is that it takes them hours to tear themselves away from "their sisters, and their cousins, and their aunts." But the parting once well over, they give little trouble, except that they will travel only at their own pace; it proved perfectly useless to try to hurry them.

After leaving Talung behind, we passed through a dense and very damp forest, principally of magnificent pines. The jungle swarmed with leeches, which fastened on to our ankles, and were very troublesome. Putties would be very useful on this journey, and I regretted I had not worn them. Having crossed a river, we reached a wooden hut, which would afford shelter for the coolies, and finding just



enough level ground to pitch our tent, we camped here for the night. The following day's march brought us to our first camp, a place marked on the map, but consisting of only one solitary hut erected to shelter herdsmen. The ground about this place was covered with yak's dung. The road ascended gradually, and a mile or so higher up we met with the first snow, which was melting fast. We now left the forest behind, and the country became open ground. The path led up a steep slope to a precipitous wall of rock, over which, to the left, descended a magnificent waterfall, called the Tizong Babza. We groped our way up the rude roadway, which ran along the face of the almost perpendicular rocky wall, using hands and knees. Progress was slow and laborious, but at last we reached the summit of the rock

safely. We here sought for a bit of level ground for our camp, but there was no level surface sufficient to pitch a tent 8 feet square. So we had to make shift on the slope of the hill, levelling our camp beds with stones. The ground was partly covered with snow. The vegetation consisted only of low rhododendron bushes, some of them still in flower. It began to rain, and the prospect from the tent was anything but cheerful. The rainfall in these high latitudes is a light drizzle, much of the character of a Scotch mist. *The year's record is not above a fourth or fifth of the quantity registered in Darjeeling.*

The weather next morning was clear and bright, and we had a splendid view of a grand snow-capped peak about two miles distant, known as Lama Anden, which rises over 19,000 feet above sea-level. After taking several photographs we pushed on. The way led over fields of snow, very soft in places, and we often sank as far as our knees. A long and heavy pull over a good many miles of slushy snow and through rhododendron fields, which also offer serious obstacles to rapid progress, the plants being thickly and strongly interlaced, brought us to a narrow valley with high hills towering on both sides. A broad but shallow river which impeded our progress, wound its way through the valley. However, we overcame all difficulties, and higher up were rewarded by discovering that the source of the river was a beautiful lake, partly frozen over; but the ice was breaking up fast, and large pieces were being carried away by the stream. We skirted the lake to the left, as the river at the junction with the lake was too deep and rapid to ford.

We were now at a height of 14,000 feet. The mountain scenery was grandly wild. Amongst the most conspicuous objects were immense boulders strewn everywhere, half buried in deep snow. Some of these boulders form natural caves or rock shelters, and are used by coolies and herdsmen as their camping-grounds, offering a welcome protection from wind and weather.

We pitched our camp at the base of the Yeumtso La. Failing to find any bare ground, we were obliged to pitch our tent on snow, which lay everywhere 8 and 10 feet deep; but we passed a comfortable night, in spite of the intense cold.

The next day dawned calm and clear, but very cold. After breakfasting in the open on the snow, we were soon afoot with the object of crossing the pass, 15,800 feet (17,040 on map). As we toiled up the steep ascent, far above us a gigantic peak lifted its hoary head, silent, frigid, and white. On we scrambled over snow and bare rocks, often wading through torrents, which descend on all sides, feeding the lake below. On reaching the summit, we halted for a while to allow the coolies to come up. The scenery viewed from the pass is of wondrous beauty. Bold and precipitous cliffs tower high up, the peaks capped with snow; here and there a block of rough splintering rocks shows through, a dark mass forming a contrast to the dazzling snow. Watercourses rush and leap down the steep sides of great mountains. Far below lies the beautiful lake, with Lama Anden forming a most effective background. It was a scene to charm the beholder with its remarkable beauty. We could not enjoy it as long as we wished, because the envious mist swept over, and shut out the view.

As we continued our route down hill, the weather cleared again, and the view of the Zemu Valley was charming. The clouds just parted to the south, and revealed the glacier which descends from the perpetual snows of Kanchinjunga. *On all the maps a large glacier is marked as a moraine.** This was the point we were aiming for, and keen speculation was excited as to whether it was a very ancient moraine

* No glaciers are marked as such on the last maps of Sikkim, issued by the Indian Survey Department, and it is but a few years ago that the Survey Report contained a statement—since contradicted—that there were no glaciers in this region.—D. W. F.

or a glacier. The view we had from the pass convinced us it was a glacier, and probably the largest in Sikkim. We could trace the Zemu River descending from its source in the glacier.

The Zemu Valley is narrow, with precipitous mountains on both sides. The view, looking down the valley, was magnificent, showing in the far distance ridge upon ridge, and behind them snow-capped peaks. The further bank of the river is covered with pine trees and grass. We halted here for a day, giving rest to the coolies, while we explored the valley up-stream. The scenery along the river is very pretty. Rhododendrons form the chief vegetation, covering the mountain slopes like a garment. Two species were still in blossom, giving the effect of balls of brilliant colours. The ground was covered with wild flowers of many descriptions. There were primroses, cowslips, and wild roses, and many other exquisite flowers of which I do not know the names. We collected many specimens, which I brought back with me in good preservation. The height of the river here is 13,000 feet. It is a boisterous torrent, rushing over big boulders. Higher up the mountain sides sloped more rapidly, and the winter snow still lay deep in some places, forming bridges of frozen snow over the river.

With the object of visiting the ice caves forming the sources of the river, we crossed over extensive snow beds and rounded big rocks on the edge of the stream. In some places large patches of rhododendron had to be passed over. In due course, after a hard climb, we reached the base of the glacier, at a height of 13,800 feet. Here we counted four distinct caves in the ice, with the water which forms the beginning of the river flowing freely out of them. The face of the glacier is about 400 to 500 feet deep, the immense mass of ice resting between the two slopes of the valley. The ice of the glacier is of a dark green colour.

It was too dangerous to remain here long on account of the huge stones that were continually falling from the glacier. They came rolling down at times in a great heap, and we had to keep a sharp look-out, and sometimes dodge them to escape annihilation. Rain commenced to fall, too, which put a stop to photographing, and we returned to camp. On the following day we sent our camp on to the other side of the glacier, and we made another attempt to photograph the ice caves. We crossed over one of the snow bridges to the opposite bank, and reached our destination after a trying march. But the weather was now bright and fine, and we attained our object, getting some excellent photographs of these curiosities of nature's architecture. We then continued our route up the steep slope of the glacier, which was difficult on account of the loose stones that went leaping down when they were touched. After marching for some miles over the glacier proper, we reached an open strip of land with high hills on the left, the glacier extending to the right. Numerous streams cut their way through the plain. An extensive mountain chain rises to the north-east, which is the Tangchung La. We removed the camp next day higher up the valley. The weather was misty, so nothing could be seen of the hills. The valley was almost a plain, with splendid grazing-grounds. We now mounted to 16,000 feet, and found our first edelweiss, growing in patches. Edelweiss is found only near perpetual ice or snow. Another plant we found was a wild rhubarb (*Rheum nobile*), growing a yard high. Its reflex brackets overlap one another like tiles, and protect the flowers from wind and rain. The natives call this plant *tekuker*,* and they eat the stems, which are not unlike the rhubarb of English gardens.

Better luck in point of weather favoured us the next morning. The mist cleared away for a short time, and we saw one of the finest shaped peaks in the Himalayas,

* See Hooker's 'Himalayan Journals,' ii. 48.

marked on the map D. 2; or Simiolehum. I succeeded in taking a fine negative of this peak before it disappeared again in the mist.

Here we left our heavy kit, the big tent, etc., and selecting a few coolies and taking a small tent, we started for the higher regions. Following the valley to the end, we pitched the tent near a small lake of beautiful clear water. The elevation here was 17,000 feet. We experienced no difficulty with regard to firewood. A dwarf juniper grew in patches on the side of the hills, which gave excellent fuel. This was a great comfort.

The following day we started to cross the glacier, intending to strike a rock not far from the foot of Kanchinjinga. The glacier descends from the perpetual snows of Kanchinjinga almost in a straight line, and is fed by many minor glaciers coming down from D. 2, and the peak to the north of it. We counted a dozen glaciers on one occasion joining the main glacier. By their different colour and character the stones which form the moraine can be traced to their original source. The side view of the glacier has the appearance of a huge embankment, with confused heaps of *débris* ready to be levelled.

A more distantly barren and desolate part of the world could not be imagined, and walking at this elevation was slow and laborious, though we experienced no discomfort in breathing. The atmosphere was very clear, and distant objects appeared much nearer than they really were. We reached a height of 17,500 feet. The scenery was wild and grand all round. To the south-west was a gap in the range of 19,300 feet (see map). The rock we had hoped to reach was still a long way off at 2 P.M., and we reluctantly turned back to camp. The rumbling noise of avalanches and the crashing of falling rocks never cease amongst these giant hills, and it is dangerous to camp near the base of a mountain.

The next day dawned gloriously. For the first time we obtained a view clear from all clouds and mist. Kanchinjinga towered high above us almost a perpendicular wall of rock and ice.* To the south Simiolehum looked like a burnt-out crater filled with snow. Then came a 17,450 feet gap in the range, with a wavy snowfield, and next to the left a magnificent group of peaks (not named on the maps). The rocks that peep through the snows are of a rugged splintered appearance, broken by the continuous frost. The view on the other side, looking down the valley, was not less grand. We could see the Donkai† and Lama Anden and a number of minor peaks. We also discovered two peaks, one in front and the other to the right of Kanchinjinga, both above 22,000 feet. We photographed to our hearts' content, and returned to camp in a happy frame of mind.

Before leaving this neighbourhood, we visited a narrow valley to the north-east of Kanchinjinga, shut in by gigantic hills. We counted here eight glaciers coming down from the different slopes, some joining the main glacier, and others ending abruptly, forming a jagged wall of ice or a more gradual slope. The rays of the sun caused these masses of ice to act like huge prisms reflecting most gorgeous colours.

We returned down the valley, and reached the main camp after two days' march. The weather now became cloudy, and we had nothing but mist and rain. The following day I said good-bye to Mr. White, and we parted, he to continue his tour to the north, and I to return to Darjeeling, where I arrived after twelve days' continuous marching, none the worse for my trip, and in the possession of a valuable collection of negatives depicting scenes at the back of Kanchinjinga, unvisited before.

* The photographs do not wholly bear out the adjective used. Sloping glaciers seem to descend transversely between the "perpendicular" tiers of cliff.—D. W. F.

† Sir J. D. Hooker would hardly have thought this possible.

Oceanography at the British Association.

PAPERS on oceanography were presented to several Sections of the Association, and although the more important were brought in the first instance to Section E, several of great value were presented to Sections A and B. The chemists very wisely arranged for a joint Sub-Section of Chemists and Geographers, which had a most successful meeting, and called forth some of the most animated discussions which were given before the Association. The original communications laid before the Sub-Section, of which only a brief abstract is now given, it is hoped will be issued as a Supplementary Paper, with full illustrations.

The papers of the Prince of Monaco, read to the Geographical Section, with remarks by Dr. Buchan and some others, are given below in full abstract; but on a subsequent occasion we hope to give a fuller treatment of the Prince's work, with a map on a larger scale than is possible in this notice. The Prince kindly showed the arrangements for scientific research on his yacht, the *Princesse Alice*, which lay in Leith Docks, to a party of members especially interested in marine studies.

A New Chart of the Currents of the North Atlantic.

By ALBERT, PRINCE OF MONACO.

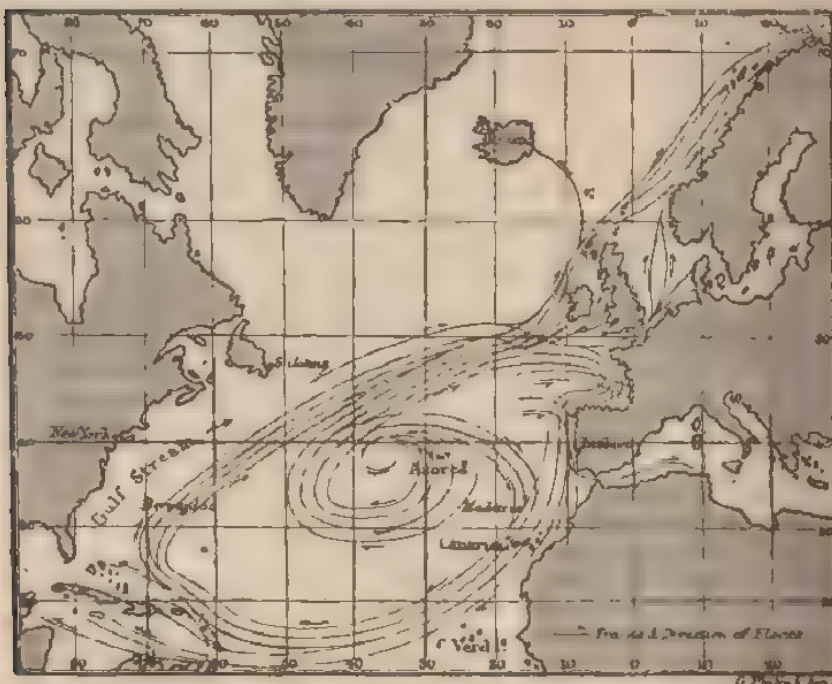
DURING the years 1885, 1886, and 1887, I made several series of experiments upon the superficial currents of the Atlantic in my sailing yacht *Hirondelle*. In 1885, as a preliminary trial, 169 floats were launched at intervals along a line 170 miles long, in the direction of N. 14° W., from a point situated 110 miles N.W. from Corvo, one of the Azores. These floats were of three different types—wooden casks, copper globes, and glass bottles. They were all weighted in a manner to prevent any part of their bulk emerging from the water and catching the wind. This first experiment having given some useful results, a further experiment was made on a larger scale in the following year. On that occasion 510 floats were launched at intervals along a line nearly on the meridian of 17° 46' west of Greenwich, 510 miles long, between 42° 34' and 50° N. latitude. The object aimed at by these experiments having been largely attained, I made a third and much more extended set of observations during the year 1887. This time 931 floats of thick glass, covered with copper, with an intermediate coat of pitch, were launched along a line extending from the Azores to the Grand Banks of Newfoundland. On returning from this voyage, a little group of floats was again launched on a length of 128 miles between the two following points, viz., lat. 49° 31' N., long 20° 7' W.; and lat. 48° 58' N., long. 20° 7' W. Each float contained a document printed in nine languages, which invited anybody who might find one of the floats to deliver it into the hands of the nearest maritime authorities, to be sent to me with detailed indications of the place and date of finding it.

Of the floats which had been thus launched in four different parts of the North Atlantic, 227 were sent back to me, and I have carefully studied their history. This has furnished me with valuable indications, not only of the direction, but also of the speed of the current, and I have already laid successively several accounts of them before the Academy of Sciences in Paris, which has published them in the 'Comptes Rendus.' Finally, at the commencement of the present year I published a chart of the currents of the North Atlantic, entirely based upon the results of these experiments.

The following table shows how the floats were distributed upon the coasts washed by the Atlantic:—Azores, 37; Madeira, 6; Canaries, 21; Iceland, 3; Norway, 22;

British Islands, 29; France (West), 36; Spain (North), 14; Africa (West), 7; Antilla, 23; Central America, 1; Bermudas, 4; open sea, 3; various, 5. The study of these facts furnishes us with the following information upon the direction and speed of superficial currents:—

Velocity of Current.—In order, in a general way, to arrive at the velocity of the current, I have divided the vortex traced out by the floats into sections, the limits of which are, first, the lines of origin of the different series of experiments, and the coasts where the first floats of the same series of experiments have appeared in groups, and within a short interval of time; then these coasts, and certain points of the coasts following, on which floats having the same origin have stranded successively in the order in which they have been launched.



[Reduced from the Prince of Monaco's New Chart of the Currents of the North Atlantic.]

Direction of the Current.—In 1880 I pointed out that the recovery of two floats in the open sea, south-west of the Azores, a very few weeks after they had been thrown overboard to the north-west of these islands, demonstrated that the internal edge of the great vortex, traced out by the whole of the floats, performs a revolution with a very short radius round a point to the south-west of the Azores, and not very distant from them. Just as in an atmospheric cyclone, there exists in this oceanic vortex a region of calm, where the waters do not follow any regular direction; and when the floats enter this region they remain there often for months or years.

The stranding of floats successively on the Azores, on the coast of Europe, Africa, Central America, the West Indies, and Bermuda in the course of a normal period; then the repetition of this same circuit, indicated by the four floats recovered in 1891 (two on the coast of France, after being afloat for four years three months, and five years three months respectively; and two on Madeira, after a voyage of

three years eleven months, and four years two months respectively) enable us to establish the fact that the cycle described by the objects drawn into the vortex of the waters of the North Atlantic is renewed indefinitely, except in the case where they escape by an offshoot into the Arctic regions along the coasts of Ireland, Scotland, and Scandinavia. This conclusion is arrived at by comparing the dates of the launch and recovery of these four floats, and applying to them the mean velocities deduced from the voyages of the earlier floats, as set forth in a table.

The indications which I thus obtain by following the floats from one station to another, round the Atlantic, are sufficiently good to permit me to offer figures which must be approximately exact.

The unpublished table which summarises these facts shows:—

1. The geographical and annual distribution of all the floats recovered.
2. The mean velocity of the first floats recovered from each series of experiments.
3. The number of floats used for the establishment of these means; and,
4. The total number of floats recovered in each district, and from each series of experiments.

In each section a certain number of the floats recovered have been rejected, because their late appearance indicated accidental retardations of unknown duration at one or more points of their course.

In some cases, a single float belonging to one series of experiments is accepted as furnishing the mean of a section, because the rate which it indicates does not differ materially from the mean rate deduced from the two other series of experiments for the same section.

The velocities which may be accounted most accurate are those furnished by floats recovered on thickly populated coasts, because they are sure to be secured without much delay, either being entangled in fishermen's nets, or picked up by boats or by persons on shore. And, in fact, it is on such coasts that we observe the smallest amount of variation in the velocities of the floats which have appeared, and for the same reason a greater number of them are available for the deduction of means. This is the case for the coasts of Madeira and the Canaries, which are always surrounded by fishing boats; for those of Portugal and Spain as well as for Ireland and Scotland. The same remark is applicable to the coasts of Morocco, as far south as the Sahara, but here it is due to the custom of the miserable tribes of the country who continually visit their extensive beaches in search of wreckage.

In the West Indies and in Norway, the great extent of the coast-line, as compared with the population, produces a contrary effect. The three floats recovered from Ireland have not been utilised, because the scarcity of population is still greater there.

I cannot utilise for the determination of the mean velocities the four floats recovered in Bermuda whose voyages have lasted years; but taken along with those picked up in the open sea to the west of the Azores, they have aided me in recognising the inner border of the oceanic vortex, and have helped me to understand why many floats which have disappeared for a long time have afterwards appeared near to these same Azores, and even, although more rarely, in Europe.

Floats which have been exceptionally long at sea have been excluded from participation in the establishment of means. On the other hand, I have applied to them the general mean velocity found from the whole of the sections, and I have laid down on the chart their courses by lines drawn parallel to the curve of general circulation, connecting their points of origin and of recovery, and of a length given, by the mean velocity multiplied by the number of days that they were afloat.

The mean velocity for the region comprised between the Azores, Ireland, and Norway is 3.97 nautical miles in twenty-four hours; between the Azores, France,

Portugal, and the Canaries it is 5.18 nautical miles in twenty-four hours. From the Canaries to the West Indies, the Bahamas, and even to Bermuda, it attains 10.11 nautical miles in twenty-four hours. In the eastern portion of the arc, which extends from Bermuda to the Azores, it falls again to 6.42 nautical miles in twenty-four hours. The mean velocity which the combined results give for the North Atlantic is 4.48 nautical miles in twenty-four hours.

It is apparent that circulation is more active on the western half-circle of the vortex than on the eastern one; and this is explained by the combined action of various causes, as the trade winds, the equatorial currents, and the Gulf Stream, also the powerful evaporation which in the tropics stimulates the circulation of the waters, as by the increase of density they always tend to re-establish equilibrium. It would now be of great importance to renew these experiments at different seasons.

Meteorological Observatories in the Atlantic Ocean.

By ALBERT, PRINCE OF MONACO.

ATTENTIVE observation of the progress made by meteorology in the last fifty years, along with the reflections suggested by my own work in the field of oceanography, have led me to conceive a plan which, if carried out, will, I feel convinced, have a very great effect in furthering the advancement of these sister sciences.

Maury's researches on the laws of the winds furnished information of so practical a nature regarding the best track for sailing ships, that navigators were able at once to save half of the time that had been formerly required to make the passage from the United States to the Equator. Since then, and principally owing to the labours of Fitzroy, Leverrier, and others, a network of observatories, which now covers all Europe, has been developed, and informs us of the simultaneous variations in the state of the atmosphere, thus enabling us to advance a certain distance in forecasting the weather. Similar observations, collected at the Weather Bureau in Washington, enable us at times to be warned of great atmospheric disturbances advancing towards us. Information collected by the same office from the multitude of ships which enter the ports of the United States, enables it to publish each month a Pilot Chart, of the greatest interest alike to mariners and meteorologists, which gives the position of the icebergs, cyclones, and wrecks met with at sea during the preceding month. It does not, however, confine itself to recording past events. By the skilful use of the large amount of material brought together, it indicates for the current month the probable limits of the fogs in certain regions of the Atlantic, and of the ice in the neighbourhood of the North American coasts; it shows also the probable direction of the winds on the whole Atlantic.

But the Atlantic is too vast a region for it to be possible to predicate what is going on in its centre from observations made on its borders; and observations made at sea, which sailors bring home, often arrive too late to be of use for forecasting. We are therefore at present very imperfectly warned of what the sea is preparing for us.

If we consider this question more closely, remembering how great is its practical importance to maritime nations, and keeping in view the great advances in scientific methods and instruments, we shall find that places, where the requisite operations could be easily made and utilised, exist in some very favourable positions in the ocean. Bermuda, the Azores, the Canaries, and the Cape Verde Islands, are already, or will be shortly, connected with the continent by telegraphic cable. It would, in the first instance, be sufficient to establish on some suitable spot in each of these groups of islands an observatory furnished with the instruments necessary

for noticing the first appearance, the nature, and the march of those disturbances, which cannot be followed from the borders of the ocean.

The Cape Verde Islands have an especial interest, because they lie in the neighbourhood of the tropic, and on the parallels where the most important cyclones are generated, which, after traversing the Atlantic, finally spend their violence on the British coasts. They have this further element of interest, that the great circulating current of the surface waters of the North Atlantic Ocean, the existence and nature of which have been confirmed by my experiments with floats, passes close to the north of them, but without touching them. Two of these islands are already in telegraphic communication with each other and with Europe.

Bermuda also forms a very useful point of observation, because it lies almost on the other extremity of the arc of the circle along which the North Atlantic cyclones pass, and near to the meridian where they most frequently curve back and direct themselves towards Europe. Bermuda is in direct telegraphic communication with North America and Europe. Observations are already made there, but are not telegraphed to Europe.

The Azores are situated not far from the centre of the same circle, which is also that of the great vortical circulation-current of this part of the ocean. A submarine cable, to connect the Azores with Portugal and with America, is at present under construction, and will shortly be laid.

Madeira occupies a position in the neutral zone which separates the trade-wind regions from those of the south-westerly winds of higher latitudes. As this region shifts with the season, this island belongs sometimes to the one region and sometimes to the other. Madeira is connected with Portugal by a duplicate cable.

The Canaries lie in a region where the trade winds take their rise, and prevail during the greater part of the year. Three of these islands, namely Tenerife, Grand Canary, and La Palma, are connected with one another and with Europe by submarine cable.

With the exception of Bermuda, all these islands have localities suitable for high-level observatories, which, if established and kept going for only a single year, would help greatly to put the meteorology of the North Atlantic on a sure and scientific basis.

In the Azores there is Pico, 7613 feet, Madeira has an elevation of 6056 feet, Tenerife over 12,000 feet, and in the Cape Verde the island of Fogo, 9760 feet. I consider that in several of these mid-Atlantic stations, where a certain number of ships and steamers call, it will often be possible to complete the daily meteorological information, with observations gathered by the said ships in the surrounding region during twelve hours before their arrival. The information would thus concern not only a spot, but a radius of perhaps one or two hundred miles.

With regard to the execution of the project, I should suggest the following general lines: The points selected would be—Bermuda; the Azores, with an observatory at the sea-level at Fayal, and one on the summit of the mountain Pico, in the neighbouring island; the island of Madeira; the Canaries (Tenerife); and one on the Cape Verdes, with auxiliary station on Fogo summit.

Great Britain might undertake the installation and upkeep of the observatory in Bermuda. The other observatories should be supported at the joint cost of the nations most interested. At each observatory the staff should consist of an observer and one assistant. The observations ought to include barometer, hygrometer, thermometer, wind, and clouds.

As the observations would belong to an altogether distinct category, it would be well that they should be transmitted in the first instance to an observatory or establishment devoted to their special consideration; and I am willing that they

should be collected at Monaco, where the Government will undertake their discussion, publication, and distribution.

Shortly, my plan is this. The western shores of Europe, especially those of Great Britain and Ireland, are exposed to continual devastation by storms which come from the westward. The only source from which we obtain warnings is the continent of North America, and the warnings thence received are of considerable value. But the width of the North Atlantic is so great that American storms lose themselves, and others are generated of which Europeans, under present circumstances, can receive no warning. The American Pilot Chart supplies abundant evidence that there are many destructive storms which devastate our coasts of which ample warning could be given if we were in telegraphic communication with a well-organised meteorological observatory in the Azores. The admirable observations made by Piazzi Smyth on the Peak of Tenerife, in the summer of 1856, give most valuable hints in connection with the establishment of observatories such as we have under consideration. The conditions as regards temperature and humidity would be quite distinct on the summits of all the islands named from the conditions at sea-level. As regards the winds, it is possible to speak with certainty only about the loftiest—that is, the peak of Tenerife. Even the summit of it is not always above the upper level of the trade winds. The summit of Fogo (9760 feet), judging from Smyth's observations at his intermediate station, Guajara (8843 feet), would lie very near the surface separating the lower and the upper systems of circulation. It is probable that both the summit of Madeira, and Pico, in the Azores, would be more often in the lower than in the upper systems. But the observations on Ben Nevis show that, for purposes of weather forecasting, this would be rather an advantage than otherwise. The results already given by the discussion of four years' observations on Ben Nevis justify the confident expectation that similar high-level observations in the middle of the Atlantic would give results of equal, and probably much greater, importance for useful and timely weather-forecasting.

It is with great satisfaction that I find myself able to inform the British Association that the French Submarine Telegraph Company, the contractors for the line between the Azores and Europe, are bound by the terms of their concession to transmit daily three free telegrams of ten words each from the Azores to Europe, and in the opposite direction, and a like number between the Azores and North America.

I propose that next winter delegates chosen by the interested nations should meet at Monaco to discuss this important question, each of them bringing the help of his experience.

In the course of remarks on this paper, Dr. A. BUCHAN said that, when the temperature of the surface-water of the Atlantic in late autumn was several degrees above the average of the season, the result was a higher temperature and a more active evaporation from the surface of the sea. This had in a number of cases been followed by the storms of the subsequent winter and spring taking a more southerly course through Europe than usual, thereby placing the inhabitants of the British Isles on the north side of the centres of those cyclones, and thus exposing them to a hard winter and spring, with prevalent northerly and easterly winds and snowstorms. In order to discover and study these phenomena, what they wanted was a first-class observatory at Bermuda. He also strongly urged the establishment of observing stations on the Azores, so that information as to the weather might be obtained. He had examined many weather reports, and it was plain that a very considerable number of storms were felt at the Azores on their way to Europe, particularly those storms that entered Europe at lower latitudes

than usual. That was to say, a low-level observatory on the Azores would supply much definite information as to east winds and severe winter weather when we were on the north side of a cyclone. As to a high-level station, one of the most valuable results already obtained was that there were two kinds of cyclones that were well marked out by the observations at the top of Ben Nevis. One was a storm or cyclone, where the winds at the top of the mountain were blowing exactly in the same direction as the winds at the sea-level all round. The storm prevailing at the sea-level prevailed at least to a higher point in the atmosphere than the top of Ben Nevis. It was part and parcel of the same great atmospheric whirl. Curiously enough, in these conditions there was a special type of air as regarded dust. But there was another and a totally distinct kind of cyclone, in which the winds at the top of Ben Nevis blew exactly in the teeth of those at sea-level, and the quality of the air was then all but dustless. Sometimes the air was so saturated at the top of the mountain that, although there was no rain or mist, a man would be drenched to the skin in two minutes. The man became a nucleus round which the vapour condensed. If they had a similar mountain observatory in the Azores, the combination of its observations with those of Ben Nevis would give a new certainty to our knowledge of what was happening in the way of weather to the westward. The combination would give to all the meteorological bureaux of Europe a table of observations to go upon that would enable them to perfect their forecasts. He suggested that they should begin with a low-level station at Bermuda, and afterwards at the Azores. Once they got the money for a high-level station at Azores its utility would be so manifest that there would be less difficulty in getting the funds to provide additional high-level stations.

On the Temperature, Density, and Motion of the Waters of the Gulf of Guinea.

By J. Y. BUCHANAN, F.R.S.

IN the year 1886 careful observations were made in the s.s. *Buccaneer* of the temperature and density of the waters of the Gulf of Guinea, during a voyage undertaken for the purpose of surveying a route for a submarine cable. These observations were made in January and February. Later in the same year, in the months of July, August, and September, similar observations were made by Capt. A. S. Thomson, R.N., in the s.s. *Silvertown*, when the cable in question was being laid. The two series of observations are therefore from the opposite seasons of the year, corresponding in date to the northern winter and summer. Generally, the temperature of the coast waters was found higher in January than in July, while the salinity, especially of the waters in the Bight, was much higher in July than in January.

The surface-water of high temperature all over the Gulf of Guinea forms a layer of generally not over 30 fathoms in thickness. A moderate breeze off shore easily blows it away, and its place is taken by the denser and colder water immediately below it. The change of the water on the line from Appi to the Island of St. Thomé between the seasons is very remarkable. The density of this water, which, at the constant temperature of 15.56°C ., is 1.0260 to 1.0262 , is higher than that of the deep abyssal water below it, and it is possible that it may come from regions farther west by a return under-current. Evidences of such a current were found when experimenting close to the equator in the longitude of Ascension.

Generally, the current along the Guinea coast was found to set strongly to the eastward, as the well-known Guinea current. In the Bight, near the Island of

St. Thomé, the current set in a north-westerly direction, and was strong enough to set the ship back, while heaving in the sounding wire, by about as much as she steamed forward between soundings. The effect of this was, that in this part the soundings were made much more closely together than was intended. As soon, however, as observations were obtained, the effect of the current was noted and allowed for.

When the *Buccanier* was on passage between Ascension and Conakry, some interesting current observations were made in the neighbourhood of the equator. Here a strong current to the eastward was found at 50 fathoms as much as 1·3 knot per hour, the surface-water setting to the westward at about 0·5 knot per hour; so that the net easterly current below was at least 0·8 knot per hour. These currents were observed and measured by suspending current drags in the water at the depth wished, and steaming so as to keep the line up and down, the distance and direction steamed being carefully noted. Floats were also used. Every day a bottle was thrown over, enclosing a request that the finder would report the discovery to the nearest authority. Four of these bottles were recovered.

PARTICULARS OF FOUR BOTTLES THROWN OVERBOARD FROM S.S. "BUCCANIER"
IN THE GULF OF GUINEA.

Bottle.	Date.	Days Drifting.	Position.		Miles Drifted.	Direction (true) Drifted.	Rate per Day.
			Latitude.	Longitude.			
A.	Jan. 1, 1886.	58	6° 40' N.	12° 32' W.	862	East; along coast.	15'
	Picked up, Mar. 6, 1886.		5° 47' N.	0° 35' E.			
B.	Jan. 8, 1886.	53	4° 49' N.	0° 38' W.	680	Ditto.	13'
	Picked up, Mar. 2, 1886.		4° 8' N.	1° 17' E.			
C.	Mar. 14, 1886.	59	6° 25' N.	11° 31' W.	372	S. 74° E.	6·3'
	Picked up, May 12, 1886.		4° 45' N.	8° 31' W.			
D.	Jan. 23, 1886.	147	0° 21' N.	7° 36' E.	230	N. 41° E.	1·6'
	Picked up, June 25, 1886.		3° 14' N.	9° 57' E.			

Bottles A and B were throw overboard not very far from each other in the beginning of January, and to the west of Cape Palmas. They were carried very rapidly to the eastward, and were picked up within three days of each other near to Cape St. Paul. Bottle C was thrown overboard also to the westward of Cape Palmas, but much further off shore, and in the month of March. It was drifted right across the routes of A and B, and was cast up on the Kroo coast. Had the same current prevailed in March as did in January, C, on arriving in the track of A and B, ought to have been carried, like them, into the Bight. Instead of this, it never even passed Cape Palmas. Bottle D was thrown overboard between the Gaboon River and St. Thomé, and drifted very slowly in a north-easterly direction, and stranded near the Cameroon River, having required 147 days to make good a distance of 230 miles. No doubt it covered a great deal more ground, being drifted back and forwards by the very conflicting currents of the region. It would be of great importance to have systematic float observations made in this region, such as the Prince of Monaco has made in the North Atlantic.

Physical Geography of the Firth of Forth.

By HUGH ROBERT MILL, D.Sc.

THE configuration of the Firths of Forth and Tay, and of the neighbouring parts of the North Sea, was briefly described, references being given to previous papers bearing on the physical conditions of the water. Since the publication of these papers the results of observations at fixed stations by the Fishery Board for Scotland furnish data for a more complete discussion. The new information mainly concerns the rate of increase of transparency in the water from the river seaward, and the effects of tidal action on temperature and salinity. The configuration of the coast and the set of the tides, together with the relative strength of current at springs and neaps, and the hour at which these extreme tides occur, explain many apparent anomalies in seasonal change of temperature. In summer estuary water is warmer, in winter colder, than that of the sea, so that, disregarding solar influence, the temperature of the water at a station near the mouth of an estuary is either at a maximum or a minimum at high water and low water, the maximum occurring with low water in summer, with high water in winter. Apart from this, there is a diurnal range of temperature due to solar heating and cooling by radiation, which, in the absence of tides, would produce a maximum in the afternoon and a minimum in the early morning. Spring tides recur fortnightly at the same hour, and evince the special tidal characteristics in an extreme degree. It so happens that on the east coast of Scotland low-water springs occur in the morning and high-water in the afternoon, and the observations at 9.0h. and 15.0h. accordingly show the resultants of this effect at the maximum. In summer, when low water occurs in the afternoon, the afternoon temperature at the Abertay lightship is over 1°C . higher than in the morning, and when high water occurs in the afternoon the temperature is nearly 1°C . lower than in the morning, no matter how strong the solar heating may be.

As a consequence of this tidal action the water at high tide in the afternoon is always saltier than at high tide in the morning.

Sub-Section of B and E on Chemical Oceanography.

The proceedings of the Sub-Section of B and E may be summarised as follows:—

Mr. J. Y. BUCHANAN, who acted as Chairman, communicated some new observations of the density of bottom water from a depth of over 2,000 fathoms off the coast of Brazil, made by Captain Thomson, of the telegraph ship *Silvertown*, by means of a *Challenger*-type hydrometer. The result is to show the probability of the deep water at that position being derived from cooling at the surface in the southern ocean. A discussion ensued on the value of hydrometer readings as compared with the gravimetric determination of density. —Professor HARTLEY, Dr. H. R. MILL, and Mr. H. N. DICKSON supported Mr. Buchanan's view of the trustworthiness of hydrometer readings made with *Challenger*-type instruments. —Professor PETTERSSON and Dr. J. GRISON maintained that, for purposes of determining the ratio of chemical composition to density, it was absolutely necessary to weigh a carefully-measured portion of water at constant temperature.

Professor PETTERSSON gave a profoundly interesting address, illustrated by large maps and diagrams, on "The Hydrography of the Kattegat and Baltic." By means of simultaneous observations at several positions, on two different occasions a complete picture of the physical and chemical conditions of the area was obtained, and partial observations carried on for a longer time served to give a clue to seasonal changes. The régime of the sea area was determined by many causes, of which the most important were the configuration of the sea-bed, the action of wind on the

water, variations of temperature with season, and lastly, and mostly, the excess of precipitation over evaporation, giving rise to a surface outflow of comparatively fresh water into the North Sea. This outflowing current—the Baltic Stream—curves northward close along the coast of Norway, and is most felt in summer. In winter it slackens, and a counter current sets into the Skagerrak from the Norwegian coast waters, the temperature of which is comparatively high. It is interesting to note that the setting in of this current coincides with the commencement of the great winter herring fishery, which ceases as soon as the cold fresh outflow recommences in spring.—Dr. A. BUCHAN and Dr. JOHN MURRAY congratulated Professor Pettersson on the excellence of his methods and the interest of the results arrived at. Together with the other practical oceanographers present, they discussed the various points of the research in a spirit of friendly criticism.

Dr. ANDRUSOFF, of St. Petersburg, read in German an interesting paper on the results of recent Russian exploration in the Black Sea, a translation of the greater part of which will subsequently be published by this Society. Several points of interest have already been noticed in our pages (see 1892, p. 161).

Dr. JOHN GIBSON, to whom the suggestion of holding the joint meeting was due, described the result of his analyses of water from various parts of the North Sea. By comparing the ratio of the principal salts of each sample of sea-water, with its density as determined by very precise weighings, he was able to distinguish between sea-waters of different origin, and to trace out in a general way the mixture of Atlantic and northern water along the east coast of Scotland.

Two oceanographical papers were read in Section A. Dr. A. BUCHAN communicated part of the preliminary result of the discussion on "Oceanic Circulation," on which he and Professor Tait have been engaged for many years, during which the original data supplied by the *Challenger* expedition have been largely supplemented by more recent expeditions. Confining his attention to the Atlantic, Dr. Buchan showed that oceanic circulation was intimately associated with atmospheric circulation, the surface currents corresponding to the surface winds. The effect of the prevailing easterly winds in the central Atlantic is to raise the temperature of the water on the west side, at depths of from 100 to 500 fathoms, at least 10° higher than that on the east side at the same depths. At 500 fathoms the temperature is almost the same at both sides; but in deeper water the effects are reversed, the western side being colder on account of the Arctic currents hugging the American coast; the eastern side warmer because of the warm dense outflow from the Mediterranean. This warm water on the eastern side extends as far north as the Wyville Thomson ridge, on the south side of which the water at 700 fathoms is warmer than water at the same depth in any part of the tropical oceans. North of the Wyville Thomson ridge the deep water has a constant temperature of 29.5° . The bearings of this most important contribution to physical geography cannot be fully appreciated until the publication of the *Challenger* volume, in which it will be completely stated.

Mr. H. N. DICKSON, in a paper on "The Physical Condition of the Waters of the English Channel," described the observations he made while connected with the Marine Biological Station at Plymouth. He found that the water in the Channel corresponded in density and chemical composition to the average Atlantic ocean water of the *Challenger* expedition. In most parts of the Channel the tidal currents keep the water thoroughly mixed throughout its whole depth. In Start Bay, however, there is a whirl in which the water is warmer in winter and colder in summer than the rest of the Channel. This greater uniformity is associated with an unusually good fishing ground.

GEOGRAPHICAL NOTES.

Area of the Great Land Divisions.—In a recent paper to the Académie des Sciences, M. Levasseur gives the result of a thorough revision of his estimates of the area and population of the five great land divisions of the globe. He compares these figures with those given by 'Die Bevölkerung der Erde,' 'The Statesman's Year-Book,' and the 'Geographisch statistische Tabellen aller Länder der Erde' for 1891, referring also to his own earlier estimates ('Proceedings,' ix. (1887), 763). In considering M. Levasseur's last results, the definitions of the land divisions which he employs must be remembered, as much of the diversity between different authorities arises from different systems of division. Europe is taken as bounded by the Kara River, the main crest of the Urals, the River Ural, the Caspian Sea to Apcheron, and thence by the crest of the Caucasus to the Black Sea. Iceland, Novaya Zemlya, and Spitzbergen are included, but not Franz Josef Land. Under Oceania are classed Australasia, the Malay Archipelago, and Polynesia, because M. Levasseur thinks it advisable to keep to five nominal divisions (yet he practically considers America as two), and to select these so that there is no great disparity of area or population between them. With North America, part of the Arctic Archipelago, Greenland, and the West Indies are included. No estimate is made as to the unexplored lands of the Arctic and Antarctic regions. The following table summarises the new data:—

	Europe.	Africa.	Asia.	Oceania.	America, N.	America, S.
Area in million square miles . }	3·844	11·724	16·222	4·267	9·110	7·188
Population in millions . . }	360	153	821	38	88	31

The whole area of the known lands is given as 52,355,000 square miles, and the population of the earth is estimated at 1497 millions.

Transparency and Water-Level of Rivers.—A series of observations, carried on at the Breslau Waterworks for five years, brings out some interesting facts as to the seasonal variations of transparency in the water of the Oder. The figure expressing transparency was the number of centimetres at which a brass plate became invisible when immersed in a specimen of the water in a glass tube. The average for the five years was 35·5; the maximum, occurring in January, was 52·1, and the minimum, in July, 18·9. The average for the summer half-year was 27·5, and for the winter half-year 43·1, thus showing a much larger amount of sediment in suspension during the summer months. The Oder has its highest water in spring, during the melting of the winter snow, and its stream is lowest in autumn. The greatest clearness of the water thus occurs just before the river begins to rise, and most sediment is found when the spring floods have almost subsided.—'Das Ausland.'

New Theory of the Origin of Mountains.—Professor E. Reyer, has recently put forward a new theory of the formation of mountain chains, which rests mainly on the results of a series of small-scale experiments (*'Nature,'* xlv. (July 7th, 1892), p. 224). He accepts Mr. Mellard Reade's theory of the rise of the isogeotherms, and subsequent expansion and wrinkling of the strata, as a consequence of sedimentation, but also gives prominence to the cooling and consequent fall of the isogeotherms in regions which have undergone extensive denudation. Contraction and subsidence thus result, and the "fold-chain" is bordered by a depression. So far the theory is directly in opposition to that which associates loading by sedimentation with depression of the crust, and unloading by erosion with elevation under the reduced pressure. Granted this difference of level, and the pseudo-plasticity of rock or of recent sediments, Professor Reyer accounts for folding by the gliding forward of the strata down the slope. Experiments with plaster and clay on an inclined base produced results closely comparable with actual rock structures produced by earth movements. Professor Reyer's conclusion is, that the folding of rocky layers is a result of gliding, and does not result from any contraction of the planet.

Lake Basins of the Pyrenees.—M. Émile Belloc, who has been engaged in a survey of the lakes of the Pyrenees, points out a remarkable difference between the configuration of the basins of the high valleys and those of the lower slopes. The latter are comparatively large, shallow, with uniformly-contoured beds, usually formed by glacial clays, and steadily diminishing in size by natural drainage, sedimentation, and the encroachment of vegetation. The Lake of Lourdes, with a maximum depth of 30 feet, is cited as a typical example. The high Pyrenean lakes are small rock-basins of very irregular form. Lake Estom, at an altitude of 6160 feet, is taken as the type. This lakelet has a gently-shelving shore on one side, but an abrupt, almost precipitous, slope from the water-surface to the comparatively flat bottom on the other. Along the inner edge of the steep slope there occurs a series of remarkable cone-shaped mounds of stone, with conical holes between them and the shore. The explanation of this singular structure M. Belloc believes to be the following. In early winter the powdery snow which covers the slopes of the high valleys slips down the steep places, forming snowy cones, which ultimately come to rest on the frozen surface of the lake, and by partial melting and regelation become themselves consolidated into névé. The shattering of the higher rocks goes on all winter, and the broken fragments roll down the slopes, and form a stony crown around the base. When the lake thaws the stones fall to the bottom, and naturally assume the form of heaps some little distance from the shore.

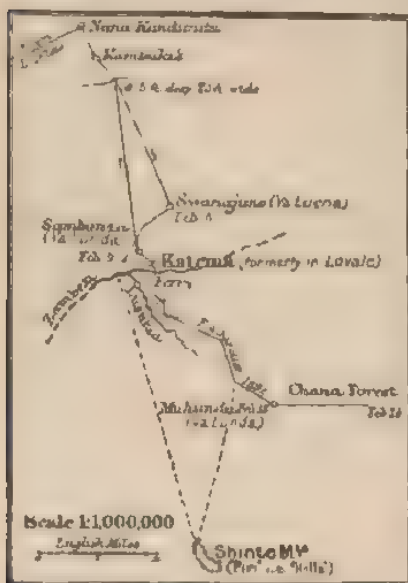
The Progress of Mr. Conway's Party in the Karakorum.—Letters received at Calcutta, dated "Askoley, July 27th," record the safe arrival at that place on the previous day of the whole of Mr. Conway's party. They left Nagar exactly a month previously (June 27th), and after spending ten days in glacial exploration and mapping in that district, addressed themselves to one of the main objects of their journey—the passage of the longest glacier pass over the greatest glaciers in the world outside the polar circles. Having sent his spare baggage, in charge of one of his companions, over the Nushik Pass—never before crossed by Europeans—and by the Braldo Valley to Askoley, Mr. Conway led his party in six marches up the great Hispar Glacier. The watershed at its head was reached on July 18th. The view from the pass was superb, extending over a vast level sea of snow some 300 square miles in area, surrounded by a ring of giant peaks, and broken by a row of summits rising island-like in its midst. The party camped just below the pass on the east side, where they were overtaken by a severe snowstorm. They descended in two marches down the Biafo Glacier to the first pasturage, whence they sent on their Alpine guide to Askoley, which he reached in one long day's march. Mr. Conway followed slowly in six days, chiefly occupied in surveying, which the bad weather rendered difficult. The whole party were thus reunited, according to the scheme arranged before leaving England, at Askoley, where stores and provisions had been collected for them before the beginning of August. The *Times* telegram adds: "The length of the pass from the foot of the Hispar Pass to the foot of the Biafo Glacier is about 90 miles. The mercury on the pass stood at 15·85 inches. No one suffered perceptibly from the rarity of the air." Letters, giving further details of his exploration of this wonderful region, will doubtless be received from Mr. Conway by the next mail.

Journal of Captain A. Conolly from Bamian to Khiva.—An interesting paper has just been printed at Simla, being part of the journal of Captain Arthur Conolly on the occasion of his expedition from Kabul to Khiva and Bokhara in 1840. The journal, which is in the form of two letters, addressed to Sir William Macnaghten at Kabul, deals first with the journey across the mountainous and little-known Hazara country (the scene of the present rebellion against the Amir), as far as Merv, and next, with the transit across the desert and the negotiations with the Khan at Khiva. The former has considerable geographical interest, the region of the Upper Murghab and Hari Rud Valleys having been almost unknown till re-explored by Captain the Hon. M. G. Talbot in 1885-86; while the latter, which is principally in the form of dialogue between the Khivan Khan and Conolly, sheds a very clear light on the Central Asian politics of those days. It will be remembered that Conolly, after visiting Khiva, repaired to Bokhara, where Stoddart was

in durance, but was unable to rescue his friend, or even to save himself, both officers being put to death by the Amir after months of imprisonment and suffering. Captain Grover and Sir John Kaye succeeded, in their respective works, in throwing much light on the Bokhara tragedy, the chapter in the 'Afghan War' of the latter author in particular being one of the most thrilling in the book. There is one episode, or, rather, sequel to the story, which remains to be cleared up, and that is, the fate of Lieutenant Wyburd, of the Indian Navy, who was despatched from Persia to discover the fate of Stoddart and Conolly, and who was reported to have been seized himself and sold into slavery. Wyburd is believed to have escaped from slavery and reached Khokand, where, however, he was again seized under suspicion of being a Russian spy. The Khan of Khokand sent a native agent to Peshawar stating that an Englishman, calling himself "Wypart," had reached that state, and that he would be released if any officer were sent to identify him as a British subject. Volunteers were not wanting for the task, but the Government of India preferred, from motives of caution, to send a native agent, whose mission, however, ended fruitlessly, for nothing is believed to have ever transpired regarding Wyburd's fate.

A Trip Across the Upper Zambezi.—The Rev. F. Schindler, a member of Mr. Arnot's Mission, has forwarded us a sketch-map of an excursion to

the southward of the main route which leads from Lake Dilolo eastward to Katanga. Starting from Nana Kandundu on February 8th of this year, Mr. Schindler arrived at Katoma's village three days afterwards. (Katema first became known to us through Dr. Livingstone.) Originally he lived far to the west, in Lovale; subsequently we find him established near Lake Dilolo, whilst for the present he has taken up his quarters on the Upper Zambezi. Crossing that river in a boat, Mr. Schindler, two days afterwards, found himself in the midst of the Chana forest. He then returned to the northward. In the course of his journey he was



able to take bearings of the Shinto Hills, erroneously called "Piri" on our maps, as "Piri" merely means "hills."

The New Frontier-Line between the Transvaal and the Portuguese Possessions.—A succinct account (with map) of the operations of the Boundary Commissions despatched in 1890 by the Portuguese and Transvaal Governments, for the purpose of laying down the frontier-line between their respective possessions in South Africa, appears in Part 6 of 'Petermann's Mittheilungen' by Mr. F. Jeppe, of Pretoria. The two Commissions met at a point close to the junction of the Crocodile and Komati Rivers at the beginning of June, 1890, and at once commenced work. The frontier as laid down runs northward in an almost straight line a little to the east of 32° E. long., until at a point 18 miles south of the 24th parallel it crosses to the west of 32° , and preserves a fairly direct line northwards till it strikes the Singwedzi River. It was at this point that the two Commissions were unable to agree. The Portuguese representatives maintained that the line should run westwards to the Serra Chieundo, on the Pafuri River, and thence direct to the confluence of the latter stream with the Limpopo; while the Transvaal Commissioners considered that the line should be drawn from the Singwedzi Poort to the confluence of the Pafuri and the Limpopo. It was determined that the question should be referred to their respective Governments, and the Transvaal Commission returned at once by a south-westerly route to Pretoria, where they arrived on August 29th. The Portuguese Commission stayed a fortnight on the Limpopo, surveying the country. Among the points fixed by astronomical observation was the important point of the junction of the Pafuri and Limpopo ($31^{\circ} 27' 29.5''$ long. and $22^{\circ} 24' 15.6''$ lat.). The members of the party travelled back to the coast by different routes, one, M. Mezzena, down the northern bank of the Elephant River, and thence to Lourenço Marques; another, Captain Serrano, along the Luize or Shengane River to Manjlagaze, in the south, and thence by the coast to Inhambane; while Captain d'Andrade and Major Xavier proceeded direct to Inhambane, which, after many difficulties, they reached on December 25th, 1890. Among the many important results of the surveys and observations made are the following :—The shifting of the frontier of the Republic considerably more to the west, the determination of the course of the Luize or Shengane, and the survey of the hitherto little-known stretch of country east of the Lower Limpopo. Generally, the Portuguese surveys confirm the observations made by St. Vincent Erskine in his travels through this region nearly 20 years ago. M. Berthoud, a missionary who has resided for a long time at Valdezia, in the district of Zoutpansberg, returned in January last from a journey eastwards to Gungunhana's Kraal at Manjobo, east of the Lower Limpopo, which occupied some months, and covered some of the ground traversed by members of the Portuguese Commission. According to M. Berthoud, the River Umchofu does not flow into the Lovedzi and the Shengane, as shown on the maps, but joins the Limpopo at Matsambo; Manjobo

lies more to the south than supposed; the course of the Limpopo is not so direct as represented, but is very winding; the Shengane is a much more important river than he had supposed, being navigable for small boats (larger than those in use at Lourenço Marques) for a long distance. As regards the navigability of the Limpopo, the observations of M. Berthoud concur with those of Captain Elton.

The Recent Census of the Colony of the Cape of Good Hope.—The results of the last census of the colony of the Cape of Good Hope, embodied in a volume of 486 pages,* has just come to hand. From it we learn that the total number of persons alive in the colony on the census day, viz., April 5th, 1891, was 1,527,224, 767,327 of which were males and 759,897 females. This, when compared with the population enumerated at the previous census—1875 to 1879—shows a numerical increase of 497,978, and a percentage increase of 48·38.

Geology of Dybowski's Expedition.—M. Stanislas Meunier has communicated to the Académie des Sciences a report on the geological specimens collected by M. Dybowski between Bembé, on the Mobangi, and Bled-el-Kuti. The journey practically led from south to north, and crossed at least three distinct massifs of crystalline rock apparently unaccompanied by any stratified formations. Of these the first, at Zuli ($5^{\circ} 46' N.$, and $17^{\circ} 31' E.$) is represented by a very fine black gneiss. At Yabanda the second crystalline massif was encountered, and is represented by granitic rocks, sometimes schistoid in texture, together with schistoid quartzite. The third was at Crampel Peak, the farthest point reached, and was composed of rocks more ancient than the preceding, being a dark-coloured gneiss, in which black mica is a very abundant constituent.

Dr. Baumann's Recent Journey to the Victoria Nyanza.—Dr. O. Baumann, in the course of his recent journey from Tanga to Kadoto, on Speke Gulf (Victoria Nyanza), has made several important discoveries. Leaving the beaten track in Lower Arusha, on the Upper Ruw, Dr. Baumann travelled in a south-westerly direction over Sogonoi plateau and through Balanga, a district abounding in water, but now quite deserted. On March 2nd he entered Ubugwe, a district of great fertility, at the southern end of Lake Manyara, first made known to the geographical world by Rebmunn and Krapf. This lake extends for about 70 miles in a S.S.W. direction, and is about 18 miles wide. Its water is salt and bitter. The natron which it deposits finds its way to the coast, where it is known as "magadi," and is mixed with the tobacco. Ubugwe occupies the same trough as the lake, and is well

* See New Geographical Publications.

cultivated. Its inhabitants are wealthy in cattle, sheep, goats, and asses. Dr. Baumann's refusal to pay *hongo* led to a fight, in which he lost fourteen men, but captured 150 head of cattle, which subsequently, in the arid region to the westward, afforded a welcome supply of food. Dr. Baumann having traced the western shore of the lake, arrived at Leilelei, where he effected the ascent to the plateau (March 19th). Five days afterwards he arrived at the trough-shaped basin of Ngorongoro, occupied by the Mutiek Masai, who, like their kinsmen to the north and west, had lost all their cattle. Having crossed a plateau rising several thousand feet above this basin, Dr. Baumann quite unexpectedly



came upon a lake of huge dimensions, called Elassi, or Nyanza ya Nyalaya, extending far to the southward, in the direction of Iramba, and having a width of about 30 miles where Dr. Baumann saw it. The Masai, who follow the eastern shore of this lake in their predatory excursions to the southward, told Dr. Baumann that a considerable river entered it from the west. This river can only be the Liwumbe, discovered by Mr. Stanley, who conceived it to be a tributary of the Victoria Nyanza, whilst Mr. Ravenstein, who computed the unpublished observations of the Rev. Mr. Pearson, inserted a note upon his map of Eastern Equatorial Africa to the effect, that if the resulting altitudes

could be trusted this was a physical impossibility. Dr. Fischer in 1885 crossed the Liwumbe, and heard that it lost itself in the Wembere Steppe, forming a small lake there in the rainy season. The lake now "discovered"—in the literal sense of the word—by Dr. Baumann has never before been heard of by any previous explorer. Leaving the lake, Dr. Baumann arrived on March 27th among the kraals of the Serengeti Masai. At his camp, Marago Duveis, he had some communication with a tribe of Nderobbo, who are armed with bows and poisoned arrows, and are strong enough to defy the Masai. Crossing the grassy region of the Busenyei Masai, Dr. Baumann on March 31st reached the first rivulet which flows in the direction of the Victoria Nyanza. Two days afterwards he entered the country of the Shashi, who extend to the lake, and whose hilly country is well cultivated. On April 12th the expedition reached Guta, a village of Kadoto, to the north of the Ruwana mouth. The route traversed by Dr. Baumann presents no difficulties to the construction of a road, except perhaps above Leilelei and to the west of Ngorongoro. Water appears to be sufficiently abundant, and although the bulk of this region may fairly be described as a "steppe," there are not wanting districts of exceeding fertility, and even "primeval forests." Dr. Baumann does not advise placing a large steamer upon the lake, as fuel is difficult to obtain. He prefers a steam-launch and a number of sailing boats, similar to those of Mr. Stokes.

Exploration of the Lulu River.—The 'Mouvement Géographique' publishes a report by Lieutenant Chaltin, in charge of the Aruwimi district, on his exploration of the country between the Aruwimi and Welle-Makua Rivers, in the great forest region. The River Lulu drains most of this country, enters the Aruwimi opposite Bazoko, close to the junction with the Congo. It is deep, but of difficult navigation owing to the number of dead tree-trunks which encumber its bed. The course is singularly tortuous; the banks are low and marshy, inundated at flood time, and the dense virgin forest extends to the water's edge; indeed, at the narrower parts of the river the trees meet overhead. The water, although flowing over sand, is of a blackish colour. With the exception of a few favoured spots, on which villages have been built, the banks of the river are uninhabitable. Makongo, on both banks, not far from the mouth, has about 100 inhabitants; Baffoli, on the left bank, is a poor little fishing village; but Bassoa, on the left bank, and Yambisai, on both sides, higher up the river, are larger agglomerations of houses, showing a comparatively dense population. At the point where the explorer left the river (nearly 2° N.) stands the village of Mapalma. The aborigines of the district are threatened with extinction by the nomadic Banjandes, who come from the north. They are entirely devoted to hunting, never cultivate the soil, and do not as a rule form villages.

From this tribe many of the best soldiers of the Congo State are recruited. From Mapalma Lieutenant Chaltin struck into the forest, continuing in a north-easterly direction for four days, when the first village, Bassali, was reached. It was found to be well-built and trimly laid out; the chief, Majoa, an intelligent young fellow, but cunning, and a great liar, had a fine house in the Arab style. A tree-branch planted before each door is used by the warriors to suspend their arms—spears, shields, and knives—upon. Neither bananas nor maize were to be seen. So far, the streams crossed flowed south to the Lulu; but advancing from Bassali, the expedition crossed the tributaries of the Rubi coming from the west. Four days later Majoropa was reached, a collection of pretty villages surrounded by large plantations of banana and manioc. The chief was a stupid old man, whose duplicity was very transparent. At Woma, three days' journey from the Welle, the expedition turned. M. Chaltin was the first man to visit this region, and his appearance excited great curiosity. Posts with small garrisons were established at each of the important villages, and steps taken to keep up communications.

Antarctic Whaling Expedition.—As we have noted in the June number (p. 415), the Dundee whaling fleet, consisting of the steamers *Balaena*, *Active*, *Diana*, and *Polar Star*, has been equipped for an Antarctic whaling voyage, and will sail in the first week of September. Such an opportunity of adding to our knowledge of high southern latitudes has not occurred since the memorable voyage of Sir James Clark Ross, fifty years ago. In order that the observations of position and of magnetic variation may be as accurate as possible, the Royal Geographical Society has supplied supplementary chronometers and compasses to the ships. Meteorological observations have also been arranged for, the instruments being supplied by the Meteorological Office. The surgeon of the *Balaena*, Mr. W. S. Bruce, of Edinburgh, is an enthusiastic naturalist and an experienced physical observer, while Dr. C. M. Donald, who goes on the *Active*, is also interested in scientific research. Detailed instructions for the guidance of these gentlemen in their scientific observations have been drawn up by the Society, which has also prepared a set of hints directing the attention of the captains to the points on which their observations are likely to be useful. Mr. B. Leigh Smith, the well-known Arctic traveller, has taken a keen interest in the expedition, and has equipped one of the vessels with the necessary apparatus for scientific observations and for photography. The expedition will probably be absent for six months.

CORRESPONDENCE.

The Island of St. Thomas.

ST. THOMAS, DANISH WEST INDIES.
August 3th, 1892.

DEAR SIR,—I note in the July number of the Royal Geographical Society's 'Proceedings' that a correspondent of the Paris Society of Commercial Geography writes, "that St. Thomas has entirely lost its importance as a commercial centre in consequence of the adoption of Barbadores as the island at which British steamers call for freight and instructions. In consequence, the fine harbour of St. Thomas, formerly crowded with steamers, is now only visited by five or six sailing vessels a month."

These statements are incorrect. The commerce of St. Thomas began to decline upon the introduction of steamships, which placed its chief customers—Cuba, Porto Rico, the neighbouring islands, and the Spanish Main—in direct communication with the European and American markets.

St. Thomas, nevertheless, is yet a place of considerable importance as a port of call, and is the chief coaling station in these waters, vessels being coaled here more cheaply and rapidly than elsewhere in the West Indies.

It is also much frequented by vessels seeking orders, an average of twenty-five sailing vessels and thirty-one large steamers calling here every month.

That it is only visited by five or six sailing vessels in a month, as asserted by the correspondent of the Paris Society of Commercial Geography, is contradicted by official statistics, and is too grave a mistake to pass unnoticed. Would you, therefore, insert these facts in your valued journal, and oblige.

Yours faithfully,

To the Editor of the 'Proceedings,' R.G.S. CHARLES E. TAYLOR, M.D., F.R.G.S.

PROCEEDINGS OF THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION.

EDINBURGH MEETING, 1892.

THE Geographical Section sat for four days during the Association week, and the meetings were unusually well attended.

The Committee of the Section was constituted as follows:—

PRESIDENT.—Professor James Geikie, D.C.L., LL.D., F.R.S., F.R.S.E., F.O.S., V.F.H. SCOT. G.S.

VICE-PRESIDENTS.—Colonel Godwin Austen, F.R.S.; J. Y. Buchanan, F.R.S.; Dr. George Dawson, C.M.G., F.R.S.; H. J. Mackinder, M.A.; E. G. Ravenstein; Baron F. von Richthofen; Coult's Trotter.

SECRETARIES.—J. G. Bartholomew, F.R.S.E.; John Coles, F.R.A.S.; J. Scott Keltie (Recorder); A. Silva White, F.R.S.E., SEC. R. SCOT. G.S.

COMMITTEE.—Albert, Prince of Monaco; J. Theodore Bent; W. T. Blanford, F.R.S.; Right Hon. Sir George F. Bowen, C.M.G.; Dr. Alexander Buchan; Dr. Burgess; G. A. Craig; H. O. Forbes; H. N. Dickson; Professor Hull, F.R.S.; James Irvine; General R. MacLagan, R.E., LL.D.; Dr. H. R. Mill; H. Yale Oldham; Admiral Sir Erasmus Ommanney, K.C.B., F.R.S.; Dr. Phené; C. E. Peck; Sir R.

Lambert Playfair, K.C.M.G.; Sir Rawdon W. Rawdon, K.C.M.G., C.B.; Ralph Richardson; Dr. P. L. Selster, F.R.S.; B. Leigh Smith; G. E. T. Smithson; Eli Sowerbutts; G. J. Symonds, F.R.S.; Colonel H. C. B. Tanner; John Thomson; Joseph Thomson; Canon Tristram, F.R.S.; Colonel Sir Charles W. Wilson, K.C.B., F.R.S.

Thursday, August 4th.

The PRESIDENT (Professor JAMES GIKIE) opened the business of the Section by the following address on—

*The Geographical Development of Coast-lines.**

Amongst the many questions upon which of late years light has been thrown by deep-sea exploration and geological research, not the least interesting is that of the geographical development of coast-lines. How is the existing distribution of land and water to be accounted for? Are the revolutions in the relative position of land and sea, to which the geological record bears witness, due to movements of the earth's crust or of the hydrosphere? Why are coast-lines in some regions extremely regular, while elsewhere they are much indented? About 150 years ago the prevalent belief was that ancient sea-margins indicated a formerly higher ocean-level. Such was the view held by Celsius, who, from an examination of the coast-lands of Sweden, attributed the retreat of the sea to a gradual drying up of the latter. But this desiccation hypothesis was not accepted by Playfair, who thought it much more likely that the land had risen. It was not, however, until after Von Buch had visited Sweden (1806-1808), and published the results of his observations, that Playfair's suggestion received much consideration. Von Buch concluded that the apparent retreat of the sea was not due to a general depression of the ocean-level, but to elevation of the land—a conclusion which subsequently obtained the strong support of Lyell. The authority of these celebrated men gained for the elevation theory more or less complete assent, and for many years it has been the orthodox belief of geologists that the ancient sea-margins of Sweden and other lands have resulted from vertical movements of the crust. It has long been admitted, however, that highly flexed and disturbed strata require some other explanation. Obviously, such structures are the result of lateral compression and crumpling. Hence, geologists have maintained that the mysterious subterranean forces have affected the crust in different ways. Mountain-ranges, they conceive, are ridged up by tangential thrusts and compression, while vast continental areas slowly rise and fall, with little or no disturbance of the strata. From this point of view it is the lithosphere that is unstable, all changes in the relative level of land and sea being due to crustal movements. Of late years, however, Trautschold and others have begun to doubt whether this theory is wholly true, and to maintain that the sea-level may have changed without reference to movements of the lithosphere. Thus Hilber has suggested that sinking of the sea-level may be due, in part at least, to absorption, while Schmuck believes that the apparent elevation and depression of continental areas are really the results of grand secular movements of the ocean. The sea, according to him, periodically attains a high level in each hemisphere alternately, the waters being at present heaped up in the southern hemisphere. Professor Suess, again, believing that in equatorial regions the sea is, upon the whole, gaining on the land, while in other latitudes the reverse would appear to be the case, points out that this is in harmony with his view of a periodical flux and reflux of the ocean between the equator and the poles. He thinks that we have no evidence of any vertical

* See map, p. 664.

elevation affecting wide areas, and that the only movements of elevation that take place are those by which mountains are upheaved. The broad invasions and transgressions of the continental areas by the sea, which we know have occurred again and again, are attributed by him to secular movements of the hydrosphere itself.

Apart from all hypothesis and theory, we learn that the surface of the sea is not exactly spheroidal. It reaches a higher level on the borders of the continents than in mid-ocean, and it varies likewise in height at different places on the same coast. The attraction of the Himalaya, for example, suffices to cause a difference of 300 feet between the level of the sea at the delta of the Indus and on the coast of Ceylon. The recognition of such facts has led Penck to suggest that the submergence of the maritime regions of North-west Europe and the opposite coasts of North America, which took place at a recent geological date, and from which the lands in question have only partially recovered, may have been brought about by the attraction exerted by the vast ice-sheets of the Glacial Period. But, as Drygalski, Woodward, and others have shown, the heights at which recent marine deposits occur in the regions referred to are much too great to be accounted for by any possible distortion of the hydrosphere. The late James Croll had previously endeavoured to show that the accumulation of ice over northern lands during glacial times would suffice to displace the earth's centre of gravity, and thus cause the sea to rise upon the glaciated tracts. More recently other views have been advanced to explain the apparently causal connection between glaciation and submergence, but these need not be considered here.

Whatever degree of importance may attach to the various hypotheses of secular movements of the sea, it is obvious that the general trends of the world's coast-lines are determined in the first place by the position of the dominant wrinkles of the lithosphere. Even if we concede that all 'raised beaches,' so called, are not necessarily the results of earth-movements, and that the frequent transgressions of the continental areas by oceanic waters in geological times may possibly have been due to independent movements of the sea, still we must admit that the solid crust of the globe has always been subject to distortion. And this being so, we cannot doubt that the general trends of the world's coast-lines must have been modified from time to time by movements of the lithosphere.

As geographers we are not immediately concerned with the mode of origin of those vast wrinkles, nor need we speculate on the causes which may have determined their direction. It seems, however, to be the general opinion that the configuration of the lithosphere is due simply to the sinking-in and crumpling-up of the crust on the cooling and contracting nucleus. But it must be admitted that neither physicists nor geologists are prepared with a satisfactory hypothesis to account for the prominent trends of the great world-ridges and troughs. According to the late Professor Alexander Winchell, these trends may have been the result of primitive tidal action. He was of opinion that the transmeridional progress of the tidal swell in early incrustive times on our planet would give the forming crust structural characteristics and aptitudes trending from north to south. The earliest wrinkles to come into existence, therefore, would be meridional or submeridional, and such, certainly, is the prevalent direction of the most conspicuous earth-features. There are many terrestrial trends, however, as Professor Winchell knew, which do not conform to the requirements of his hypothesis; but such transmeridional features, he thought, could generally be shown to be of later origin than the others. This is the only speculation, so far as I know, which attempts, perhaps not altogether unsuccessfully, to explain the origin of the main trends of terrestrial features. According to other authorities, however, the area of the earth's crust occupied by the ocean is denser than that over which the

continental regions are spread. The depressed denser part balances the lighter elevated portion. But why these regions of different densities should be so distributed no one has yet told us. Neither does Le Conte's view, that the continental areas and the oceanic depressions owe their origin to unequal radial contraction of the earth in its secular cooling, help us to understand why the larger features of the globe should be disposed as they are.

Geographers must for the present be content to take the world as they find it. What we do know is that our lands are distributed over the surface of a great continental plateau of irregular form, the bounding slopes of which plunge down more or less steeply into a vast oceanic depression. So far as geological research has gone, there is reason to believe that these elevated and depressed areas are of primeval antiquity—that they antedate the very oldest of the sedimentary formations. There is abundant evidence, however, to show that the relatively elevated or continental area has been again and again irregularly submerged under tolerably deep and wide seas. But all historical geology assures us that the continental plateau and the oceanic hollows have never changed places, although from time to time portions of the latter have been ridged up and added to the margins of the former, while ever and anon marginal portions of the plateau have sunk down to very considerable depths. We may thus speak of the great world-ridges as regions of dominant elevation, and of the profound oceanic troughs as areas of more or less persistent depression. From one point of view, it is true, no part of the earth's surface can be looked upon as a region of dominant elevation. Our globe is a cooling and contracting body, and depression must always be the prevailing movement of the lithosphere. The elevation of the continental plateau is thus only relative. Could we conceive the crust throughout the deeper portions of the oceanic depression to subside to still greater depths, while at the same time the continental plateau remained stationary, or subsided more slowly, the sea would necessarily retreat from the land, and the latter would then appear to rise. It is improbable, however, that any extensive subsidence of the crust under the ocean could take place without accompanying disturbance of the continental plateau; and in this case the latter might experience in places not only negative but positive elevation. During the evolution of our continents, crustal movements have again and again disturbed the relative level of land and sea; but since the general result has been to increase the land surface and to contract the area occupied by the sea, it is convenient to speak of the former as the region of dominant elevation, and of the latter as that of prevalent depression. Properly speaking, both are sinking regions, the rate of subsidence within the oceanic trough being in excess of that experienced over the continental plateau. The question of the geographical development of coast-lines is therefore only that of the dry lands themselves.

The greater land masses are all situated upon, but are nowhere co-extensive with, the area of dominant elevation, for very considerable portions of the continental plateau are still covered by the sea. Opinions may differ as to which fathoms-line we should take, as marking approximately the boundary between that region and the oceanic depression; and it is obvious, indeed, that any line selected must be arbitrary and more or less misleading, for it is quite certain that the true boundary of the continental plateau cannot lie parallel to the surface of the ocean. In some regions it approaches within a few hundreds of fathoms of the sea-level; in other places it sinks for considerably more than 1000 fathoms below that level. Thus, while a very moderate elevation would in certain latitudes cause the land to extend to the edge of the plateau, an elevation of at least 10,000 feet would be required in some other places to bring about a similar result.

Although it is true that the land surface is nowhere co-extensive with the great

plateau, yet the existing coast-lines may be said to trend in the same general direction as its margins. So abruptly does the continental plateau rise from the oceanic trough, that a depression of the sea-level, or an elevation of the plateau, for 10,000 feet, would add only a narrow belt to the Pacific coast between Alaska and Cape Horn, while the gain of land on the Atlantic slope of America between 30° N.L. and 40° S.L. would not be much greater. In the higher latitudes of the Northern Hemisphere, however, very considerable geographical changes would be accomplished by a much less amount of elevation of the plateau. Were the continental plateau to be upheaved for 3000 feet, the major portion of the Arctic Sea would become land. Thus, in general terms, we may say that the coast-lines of Arctic and Temperate North America and Eurasia are farther withdrawn from the edge of the continental plateau than those of lower latitudes.

In regions where existing coast-lines approach the margin of the plateau, they are apt to run for long distances in one determinate direction, and whether the coastal area be high or not, to show a gentle sinuosity. Their course is seldom interrupted by bold projecting headlands or peninsulas, or by intruding inlets, while fringing or marginal islands rarely occur. To these appearances the northern regions, as everyone knows, offer the strongest contrast. Not only do they trend irregularly, but their continuity is constantly interrupted by promontories and peninsulas, by inlets and fiords, while fringing islands abound. But an elevation of some 400 or 500 fathoms only would revolutionise the geography of those regions, and confer upon the northern coast-lines of the world the regularity which at present characterises those of Western Africa.

It is obvious, therefore, that the coast-lines of such lands as Africa owe their regularity primarily to their approximate coincidence with the steep boundary slopes of the continental plateau, while the irregularities characteristic of the coast-line of North-western Europe and the corresponding latitudes of North America are determined by the superficial configuration of the same plateau, which in those regions is relatively more depressed. I have spoken of the general contrast between high and low northern latitudes, but it is needless to say that in southern regions the coast-lines exhibit similar contrasts. The regular coast-lines of Africa and South America have already been referred to, but we cannot fail to recognise in the much indented sea-board and the numerous coastal islands of Southern Chile a complete analogy to the fiord regions of high northern latitudes. Both are areas of comparatively recent depression. Again, the manifold irregularities of the coasts of South-eastern Asia, and the multitudes of islands that serve to link that continent to Australia and New Zealand, are all evidence that the surface of the continental plateau in those regions is extensively invaded by the sea.

A word or two now as to the configuration of the oceanic trough. There can be no doubt that this differs very considerably from that of the land surface. It is, upon the whole, flat or gently undulating. Here and there it swells gently upwards into broad elevated banks, some of which have been traced for great distances. In other places narrower ridges and abrupt mountain-like elevations diversify its surface, and project again and again above the level of the sea, to form the numerous islets of Oceania. Once more, the sounding-line has made us acquainted with the notable fact that numerous deep depressions—some long and narrow, others relatively short and broad—stud the floor of the great trough. I shall have occasion to refer again to these remarkable depressions, and need at present only call attention to the fact that they are especially well-developed in the region of the Western Pacific, where the floor of the sea, at the base of the bounding slopes of the continental plateau, sinks in places to depths of three and even of five miles below the existing coast-lines. One may further note the fact that the deepest areas of the Atlantic

are met with in like manner close to the walls of the plateau—a long ridge, which rises midway between the continents and runs in the same general direction as their coast-lines, serving to divide the trough of the Atlantic into two parallel hollows.

But, to return to our coast-lines and the question of their development, it is obvious that their general trends have been determined by crustal movements. Their regularity is in direct proportion to the closeness of their approach to the margin of the continental plateau. The more nearly they coincide with the edge of that plateau, the fewer irregularities do they present; the further they recede from it, the more highly are they indented. Various other factors, it is true, have played a more or less important part in their development, but their dominant trends were undoubtedly determined at a very early period in the world's history—their determination necessarily dates back, in short, to the time when the great world-ridges and oceanic troughs came into existence. So far as we can read the story told by the rocks, however, it would seem that in the earliest ages of which geology can speak with any confidence, the coast-lines of the world must have been infinitely more irregular than now. In Palaeozoic times, relatively small areas of the continental plateau appeared above the level of the sea. Insular conditions everywhere prevailed. But as ages rolled on, wider and wider tracts of the plateau were exposed, and this notwithstanding many oscillations of level. So that one may say there has been upon the whole a general advance from insular to continental conditions. In other words, the sea has continued to retreat from the surface of the continental plateau. To account for this change, we must suppose that depression of the crust has been in excess within the oceanic area, and that now and again positive elevation of the continental plateau has taken place, more especially along its margins. That movements of elevation, positive or negative, have again and again affected our land areas can be demonstrated, and it seems highly probable, therefore, that similar movements may have been experienced within the oceanic trough.

Two kinds of crustal movement, as we have seen, are recognised by geologists. Sometimes the crust appears to rise, or, as the case may be, to sink over wide regions, without much disturbance or tilting of strata, although these are now and again more or less extensively fractured and displaced. It may conduce to clearness if we speak of these movements as regional. The other kind of crustal disturbance takes place more markedly in linear directions, and is always accompanied by abrupt folding and mashing together of strata, along with more or less fracturing and displacement. The plateau of the Colorado has often been cited as a good example of regional elevation, where we have a wide area of approximately horizontal strata apparently uplifted without much rock-disturbance, while the Alps, or any other chain of highly-flexed and convoluted strata, will serve as an example of what we may term axial or linear uplifts. It must be understood that both regional and axial movements result from the same cause—the adjustment of the solid crust to the contracting nucleus—and that the term *elevation*, therefore, is only relative. Sometimes the sinking crust gets relief from the enormous lateral pressure to which it is subjected by crumpling up along lines of weakness, and then mountains of elevation are formed; at other times, the pressure is relieved by the formation of broader swellings, when wide areas become uplifted relatively to surrounding regions. Geologists, however, are beginning to doubt whether upheaval of the latter kind can affect a broad continental area. Probably, in most cases, the apparent elevation of continental regions is only negative. The land appears to have risen because the floor of the oceanic basin has become depressed. Even the smaller plateau-like elevations which occur within some continental regions may in a similar way owe their dominance to the sinking of contiguous regions.

In the geographical development of our land, movements of elevation and depression have played an important part. But we cannot ignore the work done by other agents of change. If the orographical features of the land everywhere attest the potency of plutonic agents, they no less forcibly assure us that the inequalities of surface resulting from such movements are universally modified by denudation and sedimentation. Elevated plains and mountains are gradually demolished, and the hollows and depressions of the great continental plateau become slowly filled with their detritus. Thus, inland seas tend to vanish, inlets and estuaries are silted up, and the land in places advances seaward. The energies of the sea, again, come in to aid those of rain and rivers, so that under the combined action of all the superficial agents of change, the irregularities of coast-lines become reduced, and were no crustal movement to intervene, would eventually disappear. The work accomplished by those agents upon a coast-line is most conspicuous in regions where the surface of the continental plateau is occupied by comparatively shallow seas. Here full play is given to sedimentation and marine erosion, while the latter alone comes into prominence upon shores that are washed by deeper waters. When the coast-lines advance to the edge of the continental plateau, they naturally trend, as we have seen, for great distances in some particular direction. Should they preserve that position, undisturbed by crustal oscillation, for a prolonged period of time, they will eventually be cut back by the sea. In this way a shelf or terrace will be formed, narrow in some places, broader in others, according to the resistance offered by the varying character of the rocks. But no long inlets or fiords can result from such action. At most the harder and less readily demolished rocks will form headlands, while shallow bays will be scooped out of the more yielding masses. In short, between the narrower and broader parts of the eroded shelf or terrace a certain proportion will tend to be preserved. As the shelf is widened, sedimentation will become more and more effective, and in places may come to protect the land from further marine erosion. This action is especially conspicuous in tropical and sub-tropical regions, which are characterised by well-marked rainy seasons. In such regions immense quantities of sediment are washed down from the land to the sea, and tend to accumulate alongshore, forming low alluvial flats. All long-established coast-lines thus acquire a characteristically sinuous form, and perhaps no better examples could be cited than those of Western Africa.

To sum up, then, we may say that the chief agents concerned in the development of coast-lines are crustal movements, sedimentation, and marine erosion. All the main trends are the result of elevation and depression. Considerable geographical changes, however, have been brought about by the silting up of those shallow and sheltered seas which, in certain regions, overflow wide areas of the continental plateau. Throughout all the ages, indeed, epigene agents have striven to reduce the superficial inequalities of that plateau, by levelling heights and filling up depressions, and thus, as it were, flattening out the land surface and causing it to extend. The erosive action of the sea, from our present point of view, is of comparatively little importance. It merely adds a few finishing touches to the work performed by the other agents of change.

A glance at the geographical evolution of our own continent will render this sufficiently evident. Viewed in detail, the structure of Europe is exceedingly complicated, but there are certain leading features in its architecture which no profound analysis is required to detect. We note, in the first place, that highly disturbed rocks of Archæan and Palæozoic age reach their greatest development along the north-western and western borders of our continent, as in Scandinavia, the British Islands, North-West France, and the Iberian peninsula. Another belt of similarly disturbed strata of like age traverses Central Europe from west to east, and is seen

in the south of Ireland, Cornwall, north-west France, the Ardennes, the Thüringerwald, the Erzgebirge, the Riesengebirge, the Bohmerwald, and other heights of Middle and Southern Germany. Strata of Mesozoic and Cainozoic age rest upon the older systems in such a way as to show that the latter had been much folded, fractured, and denuded before they came to be covered with younger formations. North and north-east of the central belt of ancient rocks just referred to, the sedimentary strata that extend to the shores of the Baltic and over a vast region in Russia, range in age from Palaeozoic down to Cainozoic times, and are disposed for the most part in gentle undulations—they are either approximately horizontal or slightly inclined. Unlike the disturbed rocks of the maritime regions and of Central Europe, they have obviously been subjected to comparatively little folding since the time of their deposition. To the south of the primitive backbone of Central Europe succeeds a region composed superficially of Mesozoic and Cainozoic strata for the most part, which, along with underlying Palaeozoic and Archaean rocks, are often highly flexed and ridged up, as in the chains of the Jura, the Alps, the Carpathians, &c. One may say, in general terms, that throughout the whole Mediterranean area Archaean and Palaeozoic rocks appear at the surface only when they form the nuclei of mountains of elevation into the composition of which rocks of younger age largely enter.

From this bald and meagre outline of the general geological structure of Europe, we may gather that the leading orographical features of our continent began to be developed at a very early period. Unquestionably the oldest land areas are represented by the disturbed Archaean and Palaeozoic rocks of the Atlantic sea-board and Central Europe. Examination of those tracts shows that they have experienced excessive denudation. The Archaean and Palaeozoic masses, distributed along the margin of the Atlantic, are the mere wrecks of what, in earlier ages, must have been lofty regions, the mountain-chains of which may well have rivalled or even exceeded in height the Alps of to-day. They, together with the old disturbed rocks of Central Europe, formed for a long time the only land in our area. Between the ancient Scandinavian tract in the North and a narrow interrupted belt in Central Europe, stretched a shallow sea, which covered all the regions that now form our Great Plain; while immediately south of the central belt lay the wide depression of the Mediterranean—for as yet the Pyrenees, the Alps, and the Carpathians were not. Both the Mediterranean and the Russo-Germanic sea communicated with the Atlantic. As time went on land continued to be developed along the same lines, a result due partly to crustal movements, partly to sedimentation. Thus by-and-by the relatively shallow Russo-Germanic sea became silted up, while the Mediterranean shore-line advanced southwards. It is interesting to note that the latter sea, down to the close of Tertiary times, seems always to have communicated freely with the Atlantic, and to have been relatively deep. The Russo-Germanic sea, on the contrary, while now and again opening widely into the Atlantic, and attaining considerable depths in its western reaches, remained on the whole shallow, and ever and anon vanished from wide areas to contract into a series of inland seas and large salt lakes.

Reduced to its simplest elements, therefore, the structure of Europe shows two primitive ridges—one extending with some interruptions along the Atlantic sea-board, the other traversing Central Europe from west to east, and separating the area of the Great Plain from the Mediterranean basin. The excessive denudation which the more ancient lands have undergone, and the great uplifts of Mesozoic and of Cainozoic times, together with the comparatively recent submergence of broad tracts in the north and north-west, have not succeeded in obscuring the dominant features in the architecture of our continent.

I now proceed to trace, as rapidly as I can, the geographical development of the coast-lines of the Atlantic as a whole, and to point out the chief contrasts between them and those of the Pacific. The extreme irregularity of the Arctic and Atlantic shores of Europe at once suggests to a geologist a partially drowned land, the superficial inequalities of which are accountable for the vagaries of the coast-lines. The fiords of Norway and Scotland occupy what were at no distant date land valleys, and the numerous marginal islands of these regions are merely the projecting portions of a recently sunken area. The continental plateau extends up to and a little beyond the one hundred fathoms line, and there are many indications that the land formerly reached as far. Thus the sunken area is traversed by valley-like depressions, which widen as they pass outwards to the edge of the plateau, and have all the appearance of being hollows of subaerial erosion. I have already mentioned the fact that the Scandinavian uplands and the Scottish Highlands are the relics of what were at one time true mountains of elevation, corresponding in the mode of their formation to those of Switzerland, and, like these, attaining a great elevation. During subsequent stages of Palaeozoic time, that highly elevated region was subjected to long-continued and profound erosion—the mountain country was planed down over wide regions to sea-level, and broad stretches of the reduced land surface became submerged. Younger Palaeozoic formations then accumulated upon the drowned land, until eventually renewed crustal disturbance supervened, and the marginal areas of the continental plateau again appeared as dry land, but not, as before, in the form of mountains of elevation. Lofty table-lands now took the place of abrupt and serrated ranges and basins—table-lands which, in their turn, were destined in the course of long ages to be deeply sculptured and furrowed by subaerial agents. During this process the European coast-line would seem to have coincided more or less closely with the edge of the continental plateau. Finally, after many subsequent movements of the crust in these latitudes, the land became partially submerged—a condition from which North-western and Northern Europe would appear in recent times to be slowly recovering. Thus the highly indented coast-line of these regions does not coincide with the edge of the plateau, but with those irregularities of its upper surface which are the result of antecedent submeral erosion.

Mention has been made of the Russo-Germanic plain and the Mediterranean as representing original depressions in the continental plateau, and of the high grounds that extend between them as regions of dominant elevation, which throughout all the manifold revolutions of the past, would appear to have persisted as a more or less well-marked boundary, separating the northern from the southern basin. During certain periods it was no doubt in some degree submerged, but never apparently to the same extent as the depressed areas it served to separate. From time to time uplifts continued to take place along this central belt, which thus increased in breadth, the younger formations, which were accumulated along the margins of the two basins, being successively ridged up against nuclei of older rocks. The latest great crustal movements in our continent, resulting in the uplift of the Alps and other east and west ranges of similar age, have still further widened that ancient belt of dominant elevation which in our day forms the most marked orographical feature of Europe.

The Russo-Germanic basin is now for the most part land, the Baltic and the North Sea representing its still submerged portions. This basin, as already remarked, was probably never so deep as that of the Mediterranean. We gather as much from the fact, that while mechanical sediments of comparatively shallow-water origin predominate in the former area, limestones are the characteristic features of the southern region. Its relative shallowness helps us to understand why the

northern depression should have been silted up more completely than the Mediterranean. We must remember also that for long ages it received the drainage of a much more extensive land surface than the latter—the land that sloped towards the Mediterranean in Palaeozoic and Mesozoic times being of relatively little importance. Thus, the crustal movements which ever and anon depressed the Russo-Germanic area were, in the long run, counterbalanced by sedimentation. The uplift of the Alps, the Atlas, and other east and west ranges, has greatly contracted the area of the Mediterranean, and sedimentation has also acted in the same direction, but it is highly probable that that sea is now as deep as, or even deeper than, it has ever been. It occupies a primitive depression, in which the rate of subsidence has exceeded that of sedimentation. In many respects, indeed, this remarkable transmeridional hollow—continued eastward in the Red Sea, the Black Sea, and the Aralo-Caspian depression—is analogous, as we shall see, to the great oceanic trough itself.

In the earlier geological periods linear or axial uplifts and volcanic action again and again marked the growth of the land on the Atlantic sea-board. But after Palaeozoic times, no great mountains of elevation came into existence in that region, while volcanic action almost ceased. In Tertiary times, it is true, there was a remarkable recrudescence of volcanic activity, but the massive eruptions of Antrim and Western Scotland, of the Færø Islands and Iceland, must be considered apart from the general geology of our continent. From Mesozoic times onwards it was along the borders of the Mediterranean depression that great mountain uplifts and volcanoes chiefly presented themselves; and as the land surface extended southwards from Central Europe, and the area of the Mediterranean was contracted, volcanic action followed the advancing shore-lines. The occurrence of numerous extinct and of still existing volcanoes along the borders of this inland sea, the evidence of recent crustal movements so commonly met with upon its margins, the great irregularities of its depths, the proximity of vast axial uplifts of late geological age, and the frequency of earthquake phenomena, all indicate instability, and remind us strongly of similarly constructed and disturbed regions within the area of the vast Pacific.

Let us now look at the Arctic and Antarctic coast-lines of North America. From the extreme north down to the latitude of New York the shores are obviously those of a partially submerged region. They are of the same type as the coasts of North-western Europe. We have every reason to believe also that the depression of Greenland and North-east America, from which these lands have only partially recovered, dates back to a comparatively recent period. The fiords and inlets, like those of Europe, are merely half-drowned land valleys, and the continental shelf is crossed by deep hollows, which are evidently only the seaward continuations of well-marked terrestrial features. Such, for example, is the case with the valleys of the Hudson and the St. Lawrence, the submerged portions of which can be followed out to the edge of the continental plateau, which is notched by them at depths of 474 and 622 fathoms respectively. There is, in short, a broad resemblance between the coasts of the entire Arctic and North Atlantic regions down to the latitudes already mentioned. Everywhere they are irregular, and fringed with islands in less or greater abundance—highly denuded and deeply incised plateaus being penetrated by fiords, while low-lying and undulating lands that shelve gently seaward are invaded by shallow bays and inlets. Comparing the American with the opposite European coasts, one cannot help being struck with certain other resemblances. Thus, Hudson Bay at once suggests the Baltic, and the Gulf of Mexico, with the Caribbean Sea, recall the Mediterranean. But the geological structure of the coast-lands of Greenland and North America betrays a much closer resemblance between these

and the opposite shores of Europe than appears on a glance at the map. There is something more than a mere superficial similarity. In eastern North America and Greenland, just as in Western Europe, no grand mountain uplifts have taken place for a prodigious time. The latest great upheavals, which were accompanied by much folding and flexing of strata, are those of the Apalachian Chain and of the coastal ranges extending through New England, Nova Scotia, and Newfoundland, all of which are of Palaeozoic age. Considerable crustal movements affected the American coast-lands in Mesozoic times, and during these uplifts the strata suffered fracture and displacement, but were subjected to comparatively little folding. Again, along the maritime borders of North-east America, as in the corresponding coast-lands of Europe, igneous action, more or less abundant in Palaeozoic and early Mesozoic times, has since been quiescent. From the mouth of the Hudson to the Straits of Florida the coast-lands are composed of Tertiary and Quaternary deposits. This shows that the land has continued down to recent times to gain upon the sea—a result brought about partly by quiet crustal movements, but to a large extent by sedimentation, aided, on the coasts of Florida, by the action of reef-building corals.

Although volcanic action has long ceased on the American sea-board, we note that in Greenland, as in the West of Scotland and North of Ireland, there is abundant evidence of volcanic activity at so late a period as the Tertiary. It would appear that the great plateau-basalts of those regions, and of Iceland and the Faroe Islands, were contemporaneous, and possibly connected with an important crustal movement. It has long been suggested that at a very early geological period Europe and North America may have been united. The great thickness attained by the Palaeozoic rocks in the eastern areas of the latter implies the existence of a wide land surface from which ancient sediments were derived. That old land must have extended beyond the existing coast-line, but how far we cannot tell. Similarly, in North-west Europe, during early Palaeozoic times, the land probably stretched further into the Atlantic than at present. But whether, as some think, an actual land connection subsisted between the two continents it is impossible to say. Some such connection was formerly supposed necessary to account for the emigration and immigration of certain marine forms of life which are common to the Palaeozoic strata of both continents, and which, as they were probably denizens of comparatively shallow water, could only have crossed from one area to another along a shore-line. It is obvious, indeed, that if the oceanic troughs in those early days were of an abyssal character, a belt of shallow water would be required to explain the geographical distribution of cosmopolitan marine life-forms. But if it be true that subsidence of the crust has been going on through all geological time, and that the land areas have notwithstanding continued to extend over the continental plateau, then it follows that the oceanic trough must be deeper now than it was in Palaeozoic times. There are, moreover, certain geological facts which seem hardly explicable on the assumption that the seas of past ages attained abyssal depths over any extensive areas. The Palaeozoic strata which enter so largely into the framework of our lands have much the same appearance all the world over, and were accumulated for the most part in comparatively shallow water. A petrographical description of the Palaeozoic mechanical sediments of Europe would serve almost equally well for those of America, of Asia, or of Australia. Take in connection with this the fact that Palaeozoic faunas had a very much wider range than those of Mesozoic and later ages, and were characterised above all by the presence of many cosmopolitan species, and we can hardly resist the conclusion that it was the comparative shallowness of the ancient seas that favoured that wide dispersal of species, and enabled currents to distribute sediments the same in kind over such vast regions. As the oceanic area deepened and

contracted, and the land surface increased, marine faunas were gradually restricted in their range, and cosmopolitan marine forms diminished in numbers, while sediments, gathering in separate regions, became more and more differentiated. For these and other reasons, which need not be entered upon here, I see no necessity for supposing that a Palaeozoic Atlantis connected Europe with North America. The broad ridge upon which the Færø Islands and Iceland are founded seems to pertain as truly to the oceanic depression as the long Dolphin Ridge of the South Atlantic. The trend of the continental plateau in high latitudes is shown, as I think, by the general direction of the coast-lines of North-western Europe and East Greenland, the continental shelf being submerged in those regions for a few hundred fathoms only. How the Icelandic ridge came into existence, and what its age may be, we can only conjecture. It may be a wrinkle as old as the oceanic trough which it traverses, or its origin may date back to a much more recent period. We may conceive it to be an area which has subsided more slowly than the floor of the ocean to the north and south; or, on the other hand, it may be a belt of positive elevation. Perhaps the latter is the more probable supposition, for it seems very unlikely that crustal disturbances, resulting in axial and regional uplifts, should have been confined to the continental plateau only. Be that as it may, there is little doubt that land connection did obtain between Greenland and Europe in Cainozoic times, along this Icelandic ridge, for relics of the same Tertiary flora are found in Scotland, the Færø Islands, Iceland, and Greenland. The deposits in which these plant-remains occur are associated with great sheets of volcanic rocks, which in the Færø Islands and Iceland reach a thickness of many thousand feet. Of the same age are the massive basalts of Jan Mayen, Spitzbergen, Franz Joseph Land, and Greenland. These lavas seem seldom to have issued from isolated foci in the manner of modern eruptions, but rather to have welled up along the lines of rectilinear fissures. From the analogy of similar phenomena in other parts of the world it might be inferred that the volcanic action of these northern regions may have been connected with a movement of elevation, and that the Icelandic ridge, if it did not come into existence during the Tertiary period, was at all events greatly upheaved at that time. It would seem most likely, in short, that the volcanic action in question was connected mainly with crustal movements in the oceanic trough. Similar phenomena, as is well known, are met with further south in the trough of the Atlantic. Thus, the Volcanic Azores rise like Iceland from the surface of a broad ridge which is separated from the continental plateau by wide and deep depressions. And so again, from the back of the great Dolphin Ridge spring the volcanic islets of St. Paul's, Ascension, and Tristan d'Acunha.

I have treated of the Icelandic bank at some length for the purpose of showing that its volcanic phenomena do not really form an exception to the rule that such eruptions ceased after Palaeozoic or early Mesozoic times to disturb the Atlantic coast-lines of Europe and North America. As the bank in question extends between Greenland and the British Islands, it was only natural that both those regions should be affected by its movements. But its history pertains essentially to that of the Atlantic trough; and it seems to show us how transmeridional movements of the crust, accompanied by vast discharges of igneous rock, may come in time to form land connections between what are now widely separated areas.

Let us next turn our attention to the coast-lines of the Gulf of Mexico and the Caribbean Sea. These enclosed seas have frequently been compared to the Mediterranean, and the resemblance is self-evident. Indeed, it is so close that one may say the Mexican-Caribbean Sea and the Mediterranean are rather homologous than simply analogous. The latter, as we have seen, occupies a primitive depression,

and formerly covered a much wider area. It extended at one time over much of Southern Europe and Northern Africa, and appears to have had full communication across Asia Minor with the Indian Ocean, and with the Arctic Ocean athwart the low-lying tracts of North-western Asia. Similarly, it would seem, the Mexican-Caribbean Sea is the remaining portion of an ancient inland sea which formerly stretched north through the heart of North America to the Arctic Ocean. Like its European parallel, it has been diminished by sedimentation and crustal movements. It resembles the latter also in the greatness and irregularity of its depths, and in the evidence which its islands supply of volcanic action as well as of very considerable crustal movements within recent geological times. Along the whole northern borders of the Gulf of Mexico the coast-lands, like those on the Atlantic sea-board of the Southern States, are composed of Tertiary and recent accumulations, and the same is the case with Yucatan; while similar young formations are met with on the borders of the Caribbean Sea and in the Antilles. The Bahamas and the Windward Islands mark out for us the margin of the continental plateau, which here falls away abruptly to profound depths. One feels assured that this portion of the plateau has been ridged up to its present level at no distant geological date. But notwithstanding all the evidence of recent extensive crustal movements in this region, it is obvious that the Mexican-Caribbean depression, however much it may have been subsequently modified, is of primitive origin.*

Before we leave the coast-lands of North America, I would again point out their leading geological features. In a word, then, they are composed for the most part of Archaean and Palaeozoic rocks; no great linear or axial uplifts marked by much flexure of strata have taken place in those regions since Palaeozoic times; while igneous action virtually ceased about the close of the Palaeozoic or the commencement of the Mesozoic period. It is not before we reach the shores of the Southern States and the coast-lands of the Mexican-Caribbean Sea that we encounter notable accumulations of Mesozoic, Tertiary, and younger age. These occur in approximately horizontal positions round the Gulf of Mexico, but in the Sierra Nevada of Northern Colombia and the Cordilleras of Venezuela, Tertiary strata enter into the formation of true mountains of elevation. Thus the Mexican-Caribbean depression, like that of the Mediterranean, is characterised not only by its irregular depths and its volcanic phenomena, but by the proximity of recent mountains of upheaval, which bear the same relation to the Caribbean Sea that the mountains of North Africa do to the Mediterranean.

We may now compare the Atlantic coasts of South America with those of Africa. The former coincide in general direction with the edge of the continental plateau, to which they closely approach between Cape St. Roque and Cape Frio. In the north-east, between Cape Faria, opposite Trinidad, and Cape St. Roque, the continental shelf attains a considerably greater breadth, while South of Cape Frio it gradually widens, until, in the extreme south, it runs out towards the east in the form of a narrow ridge, upon the top of which rise the Falkland Islands and South Georgia. Excluding from consideration for the present all recent alluvial and Tertiary deposits, we may say that the coast-lands from Venezuela down to the south of Brazil are composed principally of Archaean rocks; the eastern borders of

* Professor Suess thinks it is probable that the Caribbean Sea and the Mediterranean are portions of one and the same primitive depression which traversed the Atlantic area in early Cretaceous times. He further suggests that it may have been through the gradual widening of this central Mediterranean that the Atlantic in later times came into existence.

the continent further south being formed of Quaternary and Tertiary accumulations. So far as we know, igneous rocks are of rare occurrence on the Atlantic sea-board. Palaeozoic strata approach the coast-lands at various points between the mouths of the Amazons and La Plata, and these, with the underlying and surrounding Archæan rocks, are more or less folded and disturbed, while the younger strata of Mesozoic and Cainozoic age (occupying wide regions in the basin of the Amazons, and here and there fringing the sea-coast), occur in approximately horizontal positions. It would appear, therefore, that no great axial uplifts have taken place in those regions since Palaeozoic times. The crustal movements of later ages were regional rather than axial; the younger rocks are not flexed and mashed together, and their elevation (negative or positive) does not seem to have been accompanied by conspicuous volcanic action.

The varying width of the continental shelf is due to several causes. The Orinoco, the Amazons, and other rivers descending to the north-east coast, carry enormous quantities of sediment, much of which comes to rest on the submerged slopes of the continental plateau, so that the continental shelf tends to extend seawards. The same process takes place on the south-east coast, where the River Plate discharges its muddy waters. South of latitude 40° S., however, another cause has come into play. From the mouth of the Rio Negro to the terminal point of the continent the whole character of the coast betokens a geologically recent emergence, accompanied and followed by considerable marine erosion. So that in this region the continental shelf increases in width by the retreat of the coast-line, while in the north-east it gains by advancing seawards. It is to be noted, however, that even there, in places where the shores are formed of alluvia, the sea tends to encroach upon the land.

The Atlantic coast of Africa resembles that of South America in certain respects, but it also offers some important contrasts. As the northern coasts of Venezuela and Colombia must be considered in relation rather to the Caribbean depression than to the Atlantic, so the African sea-board between Cape Spitzel and Cape Nun pertains structurally to the Mediterranean region. From the southern limits of Morocco to Cape Colony the coastal heights are composed chiefly of Archæan and Palaeozoic rocks, the low shore-lands showing here and there strata of Mesozoic and Tertiary age, together with still more recent deposits. The existing coast-lines everywhere advance close to the edge of the continental plateau, so that the submarine shelf is relatively narrower than that of Eastern South America. The African coast is still further distinguished from that of South America by the presence of several groups of volcanic islands—Fernando Po and others in the Gulf of Guinea, and Cape Verde and Canary Islands. The last-named group, however, notwithstanding its geographical position, is probably related rather to the Mediterranean depression than to the Atlantic trough.

The geological structure of the African coast-lands shows that the earliest to come into existence were those that extend between Cape Nun and the Cape of Good Hope. The coastal ranges of that section are much denuded, for they are of very great antiquity, having been ridged up in Palaeozoic times. The later uplifts (negative or positive) of the same region were not attended by tilting and folding of strata, for the Mesozoic and Tertiary deposits, like those of South America, lie in comparatively horizontal positions. Between Cape Nun and Cape Spitzel the rocks of the maritime tracts range in age from Palaeozoic to Cainozoic, and have been traced across Morocco into Algeria and Tunis. They all belong to the Mediterranean region, and were deposited at a time when the southern shores of that inland sea extended from a point opposite the Canary Islands along what is now the southern margin of Morocco, Algeria, and Tunis. Towards the close of the Tertiary

period the final upheaval of the Atlas took place, and the Mediterranean, retreating northwards, became an almost land-locked sea.

I need hardly stop to point out how the African coast-lines have been modified by marine erosion and the accumulation of sediment upon the continental shelf. The extreme regularity of the coasts is due partly to the fact that the land is nearly co-extensive with the continental plateau, but it also results in large measure from the extreme antiquity of the land itself. This has allowed of the cutting-back of headlands and the filling up of bays and inlets, a process which has been going on between Morocco and Cape Colony with probably little interruption for a very prolonged period of time. We may note also the effect of the heavy rains of the equatorial region in washing down detritus to the shores, and in this way protecting the land to some extent from the erosive action of the sea.

What now, let us ask, are the outstanding features of the coast-lines of the Atlantic Ocean? We have seen that along the margins of each of the bordering continents the last series of great mountain-uplifts took place in Palaeozoic times. This is true alike for North and South America, for Europe and Africa. Later movements which have added to the extent of land were not marked by the extreme folding of strata which attended the early upheavals. The Mesozoic and Cainozoic rocks, which now and again form the shore-lands, occur in more or less undisturbed condition. The only great linear uplifts or true mountains of elevation which have come into existence in Western Europe and North Africa since the Palaeozoic period trend approximately at right angles to the direction of the Atlantic trough, and are obviously related to the primitive depression of the Mediterranean. The Pyrenees and the Atlas, therefore, although their latest elevation took place in Tertiary times, form no exceptions to the rule that the extreme flexing and folding of strata which is so conspicuous a feature in the geological structure of the Atlantic sea-board dates back to the Palaeozoic era. And the same holds true of North and South America. There all the coastal ranges of highly flexed and folded strata are of Palaeozoic age. The Cordilleras of Venezuela are no doubt a Tertiary uplift, but they are as obviously related to the Caribbean depression as the Atlas ranges are to that of the Mediterranean. Again, we note that volcanic activity along the borders of the Atlantic was much less pronounced during the Mesozoic period than it appears to have been in earlier ages. Indeed, if we except the great Tertiary basalt-flows of the Icelandic ridge and the Arctic regions, we may say that volcanic action almost ceased after the Palaeozoic era to manifest itself upon the Atlantic coast-lands of North America and Europe. But while volcanic action has died out upon the Atlantic margins of both continents, it has continued during a prolonged geological period within the area of the Mediterranean depression. And in like manner the corresponding depression between North and South America has been the scene of volcanic disturbances from Mesozoic down to recent times. Along the African coasts the only displays of recent volcanic action that appertain to the continental margin are those of the Gulf of Guinea and the Cape de Verde Islands. The Canary Islands and Madeira may come under the same category, but, as we have seen, they appear to stand in relationship to the Mediterranean depression and the Tertiary uplift of North Africa. Of Iceland and the Azores I have already spoken, and of Ascension and the other volcanic islets of the South Atlantic it is needless to say that they are related to wrinkles in the trough of the ocean, and, therefore, have no immediate connection with the continental plateau.

Thus, in the geographical development of the Atlantic coast-lines we may note the following stages:—*First*, in Palaeozoic times the formation of great mountain-uplifts, frequently accompanied by volcanic action. *Second*, a prolonged stage of comparative coastal tranquillity, during which the maritime ranges referred to were

subject to such excessive erosion that they were planed down to low levels, and in certain areas even submerged. *Third*, renewed elevation (negative or positive), whereby considerable portions of the much denuded Archæan and Palæozoic rocks, now largely covered by younger deposits, were converted into high lands. During this stage not much rock-folding took place, nor were any true mountains of elevation formed parallel to the Atlantic margins. It was otherwise, however, in the Mediterranean and Caribbean depressions, where coastal movements resulted in the formation of enormous linear uplifts. Moreover, volcanic action is now and has for a long time been more characteristic of these depressions than of the Atlantic coast-lands.

I must now ask you to take a comprehensive glance at the coast-lines of the Pacific Ocean. In some important respects these offer a striking contrast to those we have been considering. Time will not allow me to enter into detailed description, and I must, therefore, confine attention to certain salient features. Examining first the shores of the Americas, we find that there are two well-marked regions of fiords and fringing islands—namely, the coasts of Alaska and British Columbia, and of South America from 40° S.L. to Cape Horn. Although these regions may be now extending seawards in places, it is obvious that they have recently been subject to submergence. When the fiords of Alaska and British Columbia existed as land valleys it is probable that a broad land connection obtained between North America and Asia. The whole Pacific coast is margined by mountain-ranges, which in elevation and boldness far exceed those of the Atlantic sea-board. The rocks entering into their formation range in age from Archæan and Palæozoic down to Cænozoic, and they are almost everywhere highly disturbed and flexed. It is not necessary, even if it were possible, to consider the geological history of all those uplifted masses. It is enough for my purpose to note the fact that the coastal ranges of North America and the principal chain of the Andes were all elevated in Tertiary times. It may be remarked further, that from the Mesozoic period down to the present the Pacific borders of America have been the scene of volcanic activity far in excess of what has been experienced on the Atlantic sea-board.

Geographically, the Asiatic coasts of the Pacific offer a strong contrast to those of the American borders. The latter, as we have seen, are for the most part not far removed from the edge of the continental plateau. The coasts of the mainland of Asia, on the other hand, retire to a great distance, the true margin of the plateau being marked out by that great chain of islands which extends from Kamchatka south to the Philippines and New Guinea. The seas lying between those islands and the mainland occupy depressions in the continental plateau. Were that plateau to be lifted up for 6000 or 7000 feet the seas referred to would be enclosed by continuous land, and all the principal islands of the East Indian Archipelago—Sumatra, Java, Celebes, and New Guinea—would become united to themselves as well as to Australia and New Zealand. In short, it is the relatively depressed condition of the continental plateau along the western borders of the Pacific basin that causes the Asiatic coast-lines to differ so strikingly from those of America.

From a geological point of view the differences are less striking than the resemblances. It is true that we have as yet a very imperfect knowledge of the geological structure of Eastern Asia, but we know enough to justify the conclusion that in its main features that region does not differ essentially from Western North America. During Mesozoic and Cænozoic times the sea appears to have overflowed vast tracts of Manchouria and China, and even to have penetrated into what is now the great Desert of Gobi. Subsequent crustal movements revolutionised the geography of all those regions. Great ranges of linear uplifts came into existence,

and in these the younger formations, together with the foundations on which they rested, were squeezed into folds and ridged up against the nuclei of Palaeozoic and Archaean rocks which had hitherto formed the only dry land. The latest of these grand upheavals are of Tertiary age, and, like those of the Pacific slope of America, they were accompanied by excessive volcanic action. The long chains of islands that flank the shores of Asia we must look upon as a series of partially submerged or partially emerged mountain-ranges, analogous geographically to the coast ranges of North and Central America, and to the youngest Cordilleras of South America. The presence of numerous active and recently extinct volcanoes, taken in connection with the occurrence of many great depressions which furrow the floor of the sea in the East Indian Archipelago, and the profound depths attained by the Pacific trough along the borders of Japan and the Kurile and Aleutian Islands—all indicate conditions of very considerable instability of the lithosphere. We are not surprised, therefore, to meet with much apparently conflicting evidence of elevation and depression in the coast-lands of Eastern Asia, where in some places the sea would seem to be encroaching, while in other regions it is retreating. In all earthquake-ridden and volcanic areas such irregular coastal changes may be looked for. So extreme are the irregularities of the sea-floor in the area lying between Australia, the Solomon Islands, the New Hebrides, and New Zealand, and so great are the depths attained by many of the depressions, that the margins of the continental plateau are harder to trace here than anywhere else in the world. The bottom of the oceanic trough throughout a large portion of the Southern and Western Pacific is, in fact, traversed by many great mountain ridges, the summits of which approach the surface again and again to form the numerous islets of Polynesia. But, notwithstanding the considerable depths that separate Australia from New Zealand, there is geological evidence to show that a land connection formerly linked both to Asia. The continental plateau, therefore, must be held to include New Caledonia and New Zealand. Hence the volcanic islets of the Solomon and New Hebrides groups are related to Australia in the same way as the Liu-kiu, Japanese, and Kurile Islands are to Asia.

Having rapidly sketched the more prominent features of the Pacific coast-lines, we are in a position to realise the remarkable contrast they present to the coast-lines of the Atlantic. The highly folded strata of the Atlantic sea-board are the relics of great mountains of upheaval, the origin of which cannot be assigned to a more recent date than Palaeozoic times. During subsequent crustal movements no mountains of corrugated strata were uplifted along the Atlantic margins, the Mesozoic and Cainozoic strata of the coastal regions showing little or no disturbance. It is quite in keeping with all this that volcanic action appears to have been most strongly manifested in Palaeozoic times. So many long ages have passed since the upheaval of the Archaean and Palaeozoic mountains of the Atlantic sea-board that these heights have everywhere lost the character of true mountains of elevation. Planed down to low levels, partially submerged and covered to some extent by newer formations, they have in many places been again converted into dry lands, forming plateaus—now sorely denuded and cut up into mountains and valleys of erosion. Why the later movements along the borders of the Atlantic basin should not have resulted in the wholesale plication of the younger sedimentary rocks is a question for geologists. It would seem as if the Atlantic margins had reached a stage of comparative stability long before the grand Tertiary uplifts of the Pacific borders had taken place; for, as we have seen, the Mesozoic and Cainozoic strata of the Atlantic coast-lands show little or no trace of having been subjected to tangential thrusting and crushing. Hence, one cannot help suspecting that the retreat of the sea during Mesozoic and Cainozoic ages may have been due

rather to subsidence of the oceanic trough and to sedimentation within the continental area than to positive elevation of the land.

Over the Pacific trough, likewise, depression has probably been in progress more or less continuously since Palaeozoic times, and this movement alone must have tended to withdraw the sea from the surface of the continental plateau in Asia and America. But by far the most important coastal changes in those regions have been brought about by the crumpling-up of the plateau, and the formation of gigantic mountains of upheaval along its margin. From remotest geological periods down almost to the present, the land area has been increased from time to time by the doubling-up and consequent elevation of coastal accumulations and by the eruption of vast masses of volcanic materials. It is this long-continued activity of the plutonic forces within the Pacific area which has caused the coast-lands of that basin to contrast so strongly with those of the Atlantic. The latter are incomparably older than the former—the heights of the Atlantic borders being mountains of denudation of vast geological antiquity, while the coastal ranges of the Pacific slope are creations but of yesterday as it were. It may well be that those Cordilleras and mountain-chains reach a greater height than was ever attained by any Palaeozoic uplifts of the Atlantic borders. But the marked disparity in elevation between the coast-lands of the Pacific and the Atlantic is due chiefly to a profound difference in age. Had the Pacific coast-lands existed for as long a period and suffered as much erosion as the ancient rocks of the Atlantic sea-board, they would now have little elevation to boast of.

The coast-lines of the Indian Ocean are not, upon the whole, far removed from the margin of the continental plateau. The elevation of East Africa for 6000 feet would add only a very narrow belt to the land. This would still leave Madagascar an island, but there are geological reasons for concluding that this island was at a far distant period united to Africa, and it must therefore be considered as forming a portion of the continental plateau. The great depths which now separate it from the mainland are probably due to local subsidence, connected with volcanic action in Madagascar itself and in the Comoro Islands. The southern coasts of Asia, like those of East Africa, approach the edge of the continental plateau, so that an elevation of 6000 feet would make little addition to the land area. With the same amount of upheaval, however, the Malay Peninsula, Sumatra, Java, and West Australia, would become united, but without extending much further seawards. Land connection, as we know, existed in Mesozoic times between Asia, Australia, and New Zealand, but the coast-lines of that distant period must have differed considerably from those that would appear were the regions in question to experience now a general elevation. The Archæan and Palaeozoic rocks of the Malay Peninsula and Sumatra are flanked on the side of the Indian Ocean by great volcanic ridges, and by uplifts of Tertiary strata, which continue along the line of the Nicobar and Andaman Islands into Burma. Thus, the coast-lines of that section of the Indian Ocean exhibit a geographical development similar to that of the Pacific sea-board. Elsewhere, as in Hindustan, Arabia, and East Africa, the coast-lines appear to have been determined chiefly by regional elevations of the land or subsidence of the oceanic trough in Mesozoic and Cainozoic times, accompanied by the outwelling of enormous floods of lava. Seeing, then, that the Pacific and the Indian Oceans are pre-eminently regions which, down to a recent date, have been subject to great crustal movements and to excessive volcanic action, we may infer that in the development of their coast-lines the sea has played a very subordinate part. The shores, indeed, are largely protected from marine erosion by partially emerged volcanic ridges and by coral islands and reefs, and to a considerable extent also by the sediment which, in tropical regions especially, is swept down to the coast

in great abundance by rains and rivers. Moreover, as the geological structure of these regions assures us, the land would appear seldom to have remained sufficiently long at one level to permit of much destruction by waves and tidal currents.

In time, then, we arrive at the general conclusion that the coast-lines of the globe are of very unequal age. Those of the Atlantic were determined as far back as Palaeozoic times by great mountain uplifts along the margin of the continental plateau. Since the close of that period many crustal oscillations have taken place but no grand mountain-ranges have again been ridged up on the Atlantic sea-board. Meanwhile, the Palaeozoic mountain-chains, as we have seen, have suffered extensive denudation, have been planed down to the sea-level, and even submerged. Subsequently converted into land, wholly or partially as the case may have been, they now present the appearance of plains and plateaus of erosion, often deeply indented by the sea. No true mountains of elevation are met with anywhere in the coast-lands of the Atlantic, while volcanic action has well-nigh ceased. In short, the Atlantic margins have reached a stage of comparative stability. The trough itself, however, is traversed by at least two well-marked banks of upheaval—the great meridional Doldrums Ridge, and the approximately transverse Færoe-Icelandic belt—both of them bearing volcanic islands.

But while the coast-lands of the Atlantic proper attained relative stability at an early period, those of the Mediterranean and Caribbean depressions have up to recent times been the scenes of great crustal disturbance. Gigantic mountain-chains were uplifted along their margins at so late a period as the Tertiary, and their shores still witness volcanic activity.

It is upon the margins and within the trough of the Pacific Ocean, however, that subterranean action is now most remarkably developed. The coast-lines of that great basin are everywhere formed of grand uplifts and volcanic ranges, which, broadly speaking, are comparable in age to those of the Mediterranean and Caribbean depressions. Along the north-east margin of the Indian Ocean the coast-lines resemble those of the Pacific, being of like recent age, and similarly marked by the presence of numerous volcanoes. The northern and western shores, however (as in Hindustan, Arabia, and East Africa), have been determined rather by regional elevation or by subsidence of the ocean-floor than by axial uplifts—the chief crustal disturbances dating back to an earlier period than those of the East Indian Archipelago. It is in keeping with this greater age of the western and northern coast-lands of the Indian Ocean that volcanic action is now less strongly manifested in their vicinity.

I have spoken of the comparative stability of the earth's crust within the Atlantic area as being evidenced by the greater age of its coastal ranges and the declining importance of its volcanic phenomena. This relative stability is further shown by the fact that the Atlantic sea-board is not much disturbed by earthquakes. This, of course, is what might have been expected, for earthquakes are most characteristic of volcanic regions and of those areas in which mountain-uplifts of recent geological age occur. Hence, the coast-lands of the Pacific and the East Indies, the borders of the Caribbean Sea, the volcanic ridges of the Atlantic basin, the lands of the Mediterranean, the Black Sea, and the Aralo-Caspian depressions, the shores of the Red Sea, and vast tracts of Southern Asia, are the chief earthquake regions of the globe. It may be noted, further, that shocks are not only most frequent but most intense in the neighbourhood of the sea. They appear to originate sometimes in the volcanic ridges and coastal ranges, sometimes under the floor of the sea itself. Now earthquakes, volcanoes, and uplifts are all expressions of the one great fundamental fact that the earth is a cooling and contracting body, and they indicate the lines of weakness along which the enormous pressures and

strains induced by the subsidence of the crust upon its nucleus find relief. We cannot tell why the coast-lands of the Atlantic should have attained at so early a period a stage of relative stability—why no axial uplifts should have been developed along their margins since Palaeozoic times. It may be that relief has been found in the wrinkling-up of the floor of the oceanic trough, and consequent formation of the Dolphin Ridge and other great submarine foldings of the crust; and it is possible that the growth of similar great ridges and wrinkles upon the bed of the Pacific may in like manner relieve the coast-lands of that vast ocean, and prevent the formation of younger uplifts along their borders.

I have already remarked that two kinds of elevatory movements of the crust are recognised by geologists—namely, axial and regional uplifts. Some, however, are beginning to doubt, with Professor Suess, whether any vast regional uplifts are possible. Yet the view that would attribute all such apparent elevations of the land to subsidence of the crust under the great oceanic troughs is not without its difficulties. Former sea-margins of very recent geological age occur in all latitudes, and if we are to explain these by sub-oceanic depression, this will compel us to admit, as Suess has remarked, a general lowering of a sea-level of upwards of 1000 feet. But it is difficult to believe that the sea-floor could have subsided to such an extent in recent times. Suess thinks it is much more probable that the high-level beaches of tropical regions are not contemporaneous with those of higher latitudes, and that the phenomena are best explained by his hypothesis of a secular movement of the ocean—the water being, as he contends, alternately heaped up at the equator and the poles. The strand-lines in high latitudes, however, are certainly connected with glaciation in some way not yet understood; and if it cannot be confidently affirmed that they indicate regional movements of the land, the evidence, nevertheless, seems to point in that direction.

In concluding this imperfect outline-sketch of a large subject, I ought perhaps to apologise for having trespassed so much upon the domains of geology. But in doing so I have only followed the example of geologists themselves, whose divagations in territories adjoining their own are naturally not infrequent. From much that I have said, it will be gathered that with regard to the causes of many coastal changes we are still groping in the dark. It seems not unlikely, however, that as light increases we may be compelled to modify the view that all oscillations of the sea-level are due to movements of the lithosphere alone. That is a very heretical suggestion; but that a great deal can be said for it anyone will admit after a candid perusal of Suess's monumental work, '*Das Antlitz der Erde*.'

NEW GEOGRAPHICAL PUBLICATIONS.

(By HUGH ROBERT MILL, D.Sc., *Librarian, R.G.S.*)

EUROPE.

Belloc, Émile.—Sur certaines formes de comblement, observées dans quelques lacs des Pyrénées. *Comptes Rendus*, cxv. (1892): 196–198.

Observations of some marked differences in character between the configuration of the lakes in the high valleys and at the base of the Pyrenees.

Bergner, Rudolf.—Zur Topographie und Ethnologie Siebenbürgens. *Das Ausland*, Lxv. (1892): 325–328, 340–344, 358–363.

Description of Transylvania and its people.

Cremér, Leo.—Ein Ausflug nach Spitzbergen. Berlin, F. Dümmler, 1892: 8vo, pp. 80. Price 1m. 50.

This lively description of a cruise to Spitzbergen in the summer of 1891 gives some account of the west coast of the main island. The author made botanical and geological collections, which are reported on by Dr. Holzapfel, Dr. F. Pax, Dr. H. Potonié, and others.

De Launay.—Description géologique des Îles de Méthlin et de Thasos (mer Égée). *Nouvelles Archives des Missions Scientifiques*, Paris, I. (1891): 127-175.

A very full account of the petrography and geology of Mytleni, including a chapter on recent seismic movements, and notes on the geographical conditions of the island.

Forel, F. A.—L'avalanche du glacier des Têtes Ronces. *Catastrophes des Saint-Gervais-les-Bains. Comptes Rendus*, cxv. (1892): 193-196.

Hansen [Dr.], E.—Die Sprachgrenzen in Schleswig. *Globus*, LXI. (1892): 376-380.

Summary of the population of Schleswig according to language, with map showing areas inhabited by German, Danish, and Frisian speakers, and the transition zone of Danish and German speech.

Ramaer, J. C.—De Omvang van het Haarlemmermeer en de meren waaruit het ontstaan is, op Verschillende Tijden voor de Droogmaking. Pp. 272. Maps. In the *Verhandelingen der k. Akademie van Wetenschappen* (Amsterdam), xxix. (1892).

Historical account of the extent and character of the former Haarlem Lake at various periods in the past, and of the progress of drainage works, with maps showing the successive variations in the lake.

[**Switzerland.**]—*Statistisches Jahrbuch der Schweiz*. Herausgegeben vom Statistischen Bureau des eidgenössen Departments des Innern. Erster Jahrgang. Bern, 1891: 8vo, pp. xiv. and 265. Two maps. [Presented by the Statistical Department of the Federal Government.]

An admirably-arranged year-book of Swiss statistics, printed in French and German, in parallel columns.

Weigand [Dr.], Gustav. Von Berat über Muskopolje nach Gjordscha. *Globus*, LXI. (1892): 369-376.

A journey through Albania in 1889.

ASIA.

Curzon [Hon.], George N.—Persia and the Persian Question. London, Longmans, Green, & Co., 1892: large 8vo, 2 vols., pp. xxiv. and 639, and xii. and 653. Price 42s. Maps and illustrations. [Presented by the Publishers.]

Mr. Curzon has in these two volumes produced a book which will live: it is a monument of patient research and erudition, minute observation, keen insight into oriental character, and amply fills the long-felt want of a standard work on Persia. Though many books on that country have been written, by travellers and others, commencing with that of Herodotus at the dawn of history and ending with Mrs. Bishop's fascinating volumes, published in 1891, it remained for Mr. Curzon to give us a work which is a compendium of all the information that could possibly be required, and at the same time most interesting as a book of travel.

The large map accompanying this work, which has been prepared by Mr.

Curzon with the assistance of the Royal Geographical Society, is itself a most valuable contribution to the knowledge of the geography of Persia and the neighbouring countries of Asia (see 'Proceedings' for February, 1892). The only fault that can be found with it is its somewhat small scale of 60 miles to the inch; but that could not be avoided where a country so extensive as Persia had to be brought into one sheet which could be folded up conveniently for the traveller or the man of business. Few Englishmen realise that Persia is as large as France and Spain and the German Empire combined. In the ordinary atlases we have at least a separate map of each of these countries, and even then it is impossible to show all the features that should be shown. How much greater would be the difficulty if all three of these countries were crowded into a single sheet! The geography of the Eastern World would certainly be easier to learn if we could have maps of Asia on scales approximating those used in maps of Europe.

It may appear that a book containing 1292 pages is a formidable work to attack; but the writer carries one so pleasantly along with him on his journey, and so interests him in every feature of the country, that as the picture is developed, from the first geographical outline to the last detail concerning contemporary life and art, there is no laboured line, and the finishing touch is not given until, with a sense of rich reward, the reader lays down the book.

The author has, in a note, called attention to the parts of the work which should be read by those who are not students, but wish to obtain only a superficial knowledge of the country, and to be amused by the perusal of a narrative of interesting travels. He advises readers of this class to confine themselves to Chapters i., iii., v., vi., vii., x., xi., xiii., xiv., xv., xix., xx., xxi., xxv., xxx., but the student will naturally miss no word of the whole.

The incidents of the journey are treated in a masterly fashion, important side-lights on Persian life and customs flashing from anecdotes which a writer less versed in the ways of men would probably ignore as too trivial for quotation.

In treating the question of the geography of Persia and its boundaries, Mr. Curzon brings before us very graphically the difficulties that beset the delimitation of the frontiers of that country. The delimitation of the western frontier, which was commenced by an International Commission as early as 1843, is not even yet finally settled, and violent disputes between Persia and Turkey as to the possession of certain villages often occur, the latest dispute having taken place so lately as 1889. The northern frontier is pretty accurately fixed, though even here difficulties as to the exact boundary sometimes occur with Russia. On the north-east from the village of Lutfabad to Sarakhs, on the Tejend River, the frontier is said to have been fixed by a secret treaty; but there is no published treaty or any public document to indicate the exact position of the line, and it is just at this point that encroachments are likely to occur. From Sarakhs to the point where the Heri Rud, or Tejend, turns northwards, the boundary, being a river, is well defined. Further south the dispute between the Afghan and Persian Governments as to the possession of the District of Hashtadan has led to a definite demarcation of a small portion of this frontier by General MacLean, to whom the quarrel was referred for settlement. Again, southwards of Hashtadan to the point where Sir Frederic Goldsmid and the Sistan Boundary Commission worked, a more or less recognised boundary has existed between Persia and Afghanistan, but it has never been defined, and leaves abundant opportunities for recurrent disputes. The frontier between Persia and Afghanistan, in Sistan, has been defined by the Anglo-Perso-Afghan Boundary Commission, under Sir Frederic Goldsmid, as far as Kuh Mack-r-Siah, but from this point to Jalk, a distance of 200 miles, the border has never been properly laid down. Belachistan is here the neighbour of Persia, but no one knows exactly where the frontier is situated. Lastly, the portion of the eastern frontier of Persia, between Jalk and the port of Gwetter, on the sea coast, a distance of 130 miles, was defined by Sir F. Goldsmid in 1871, but is not uniformly observed.

Mr. Curzon pictures Persia as mainly a high tabicland, or plateau, having

an average elevation of from 3000 to 4000 feet above sea-level, ribbed with mountain chains which run generally in a direction from north-west to south-east. He shows the difficulties, both natural and political, which prevent, or rather retard, the advance of the country, especially with regard to the making of railroads, without which, in the present day, there can be but slow progress. No one after reading his account of the journey from Shiraz to the port of Bushire, over the Kotal Pin-i-zan, Kotal Dokhter, and Teng-i-Turkan Passes, will speak or write of making a railway from Bushire, on the Persian Gulf, to the Caspian Sea, as newspaper correspondents have more than once done. At page 613, Mr. Curzon puts this matter of the construction of railways very clearly. He says:—"Every railway from the coast must climb from the sea-level to that of the elevated plateau, varying from 3000 to 4000 feet in height, which constitutes the bulk of Persia, and upon which all the great cities are placed. The passes conducting to this plateau are commonly of great altitude and steepness, ranging from 4000 feet to 8000 feet in height, and being, as a rule, so precipitous that even mule traffic upon them is not unattended with danger."

These difficulties are found in a somewhat less degree on the ascent to this plateau from the Caspian Sea. But the difficulties of a political character to be encountered before a railway could be constructed are far greater than those due to the configuration of the land. They are fully explained in the chapter on railways, page 621 and onwards. The projected line from Shuster, or Mohammerah, is, in Mr. Curzon's opinion, the one most likely to pay, as it passes through a grain-producing country, and the Southern Persian cities are more easily reached from this side; but it is one that would, for political reasons, meet with much opposition.

Another railway project, which is favoured by Mr. Curzon, is the extension of the present Indian railway from Quetta, or Chaman, through Beluchistan, to the Persian frontier in Seistan. This line, though it would pass through rather a desolate country, would have no physical difficulties of any importance to contend with, while, being made entirely through British territory in Beluchistan up to the Persian frontier, it would be in our own hands, and would enable the British trader to compete on equal terms with the Russian trader, who now brings his goods to the frontier of Khorasan by the trans-Caspian railway at a small expense. The advantage which this railway gives the Russian trader, and the extent to which English trade is thereby handicapped, are clearly set forth.

The chapter on Persepolis, and the account of the reading of the great Behistun or Bisitun inscription—a translation of which was first given to the world by Sir Henry Rawlinson—is of particular interest. The value to the ethnologist of the description of the various races who inhabit Persia, differing in language and origin, must be great, while the numerous photographs enable the different types of faces to be recognised and compared.

Prominent on all maps of Persia are the two great deserts—the Dasht-i-Kasir and the Dasht-i-Lut. A vivid description of both these remarkable wastes is given, which enables the reader to realise their utter desolation. Commerce and trade are very fully treated of, and it is shown how very large a portion of the trade of Persia is still in British hands in spite of the efforts that have been made by other nations to obtain the foremost place. A most interesting account is given of early British trade with Persia, both by the Caspian Sea and the Persian Gulf, an incident of historical commercial geography which has been largely lost sight of.

Small maps scattered through the volumes are an immense help to the reader, enabling him to study the subject under consideration at the moment without constantly referring to the large map at the end of the book. In execution and design these small maps leave nothing to be desired.

The index is most complete, and enables the book to be used by the student almost as readily as if it were a gazetteer of Persia.

The only point on which Mr. Curzon perhaps scarcely does justice to the Persian Government is, that he hardly allows enough weight to the inherent difficulty it has to contend with in ruling a country of such great extent

inhabited by a great variety of races. Portions of that territory are as mountainous as Switzerland, and a considerable number of its inhabitants are still nomads. Some of these nomads, in addition, owe a divided allegiance, which they are rarely inclined to pay, in the one case to Persia and Turkey, in the other to Persia and Russia, passing freely, according to the season, from one country to another accompanied by their flocks and herds.—[C. E. S.]

AFRICA.

Edwards [Miss], A. B.—*Pharaohs, Fellahs, and Explorers*. London, Osgood, McIlvaine & Co., 1892: pp. 325, with illustrations. Price 18s.

This is an exceedingly attractive and readable book. It contains the substance of a course of lectures delivered in the United States, and is designedly of a popular nature.

Among the most interesting results of recent discoveries in Egypt is that of the early appearance in Egypt of tribes from Greece. The development of Greek art from Egyptian is convincingly proved from the remains found in those towns where Greek prisoners resided—though, possibly, Miss Edwards has not done justice to what is original in Greek and Etruscan work. The last, and, perhaps, most interesting chapter is devoted to the reign and exploits of Queen Hatsheut. During her reign the second great expedition to the land of Punt (identified as the Somali coast) took place. Hatsheut's expedition sailed from Thebes, and, in Miss Edwards's opinion, found its way by a canal through Bubastis to Lake Timnah, thence to the Red Sea. Much of the information is new, and even what is given at second hand is ably rendered. The illustrations and photographs add greatly to the appearance of the book; but there is, unfortunately, no map.

AMERICA.

Coudreau, Henri.—*Dix Ans de Guyane*. Bulletin de la Société de Géographie. Paris [7] XII. (1892): 447-180.

Summary of the geographical and ethnographical results of three important exploring expeditions in the interior of French Guiana.

[**Guatemala.**].—Informe dirigido al Señor Ministro de Fomento por el Director General de Estadística Correspondiente al Año de 1891. Guatemala, 1892: large 8vo, pp. 13 and 80.

Mohler, G.—*Explorations dans la Patagonie australe*. Bulletin de la Société de Géographie, Paris [7], xiii. (1892): 128-159.

A journey in 1890 up the Chubut (43° 50' S.) and Rio Chico to Lake Fontana, in the Andes, thence southward and down the southern Rio Chico to the mouth of the Salta Cruz, in 50° S.

Pike, Warburton.—*The Barren Ground of Northern Canada*. London, Macmillan & Co., 1892: 8vo, pp. ix. 300. Price 10s. 6d. [Presented by the Publishers.]

Mr. Pike professes to write, exclusively for sportsmen, the narrative of a somewhat remarkable journey carried out for purely sporting purposes. The object of his visit to the barren ground was to shoot musk-ox and caribou; this was fully accomplished, and is here graphically described. Setting out from Calgary, on the Canadian Pacific Railway, in June, 1889, he drove to Athabasca landing, caught the Hudson Bay Company's steamer, and ultimately reached the Great Slave Lake, to the north of which he hunted the caribou and musk-ox in company with a party of Yellow Knife Indians. The winter of 1889-90 was spent in this way, and with the advance of spring an expedition down the Great Fish River was attempted; but the terror of the Copper Knife Indians for the Eskimo, whose country they were entering, made

it impossible to go far. Mr. Pike also was anxious to return and make a dash across the Rocky Mountains before winter. He accordingly proceeded through Lake Athabasca, and up the Peace River to Fort Vermilion, where he got a crew and continued to Hudson's Hope. Here he attempted, too late in the season, to ascend the river through the Peace River Pass to MacLeod's Lake; but his half-breed guides lost their way, and after coming very near starvation, he succeeded not a day too soon in struggling back to Hudson's Hope. In the spring of 1891 he returned to England, *via* Edmonton and Calgary.

Mr. Pike had a successful, and, to one who is not dependent on the resources of civilisation, enjoyable expedition, and it was his good fortune to tramp over much ground, and to navigate many lakes and rivers, that have never been mapped. Yet geographically he confesses that his journey is unimportant. He had no instruments, and travelled without a compass, hence his sketch of the new lakes and river courses cannot be accepted as cartographic material except in a very general way. He allows that "it says little for later geographical research" that Arrowsmith's old map of 1834 is better than the most recent one issued by the Canadian Government. An expedition to the barren ground is only possible to a few, and it would be better, even for sportsmen, if the few able to visit these unknown lands carried at least a compass and knew how to use it for the benefit of those who come after.

There is a capital index, which in itself repays perusal.

AUSTRALASIA.

Forbes, H. O.—British New Guinea as a Colony. 8vo, pp. 20.

A critical investigation of the conditions of New Guinea, as regards white settlers and natural resources, from 'Blackwood's Magazine,' vol. cliv., pp. 82-100.

Parker, Gilbert.—Round the Compass in Australia. London, Hutchinson & Co., 1892: 8vo, pp. xii. and 447. Price 7s. 6d.

A series of interesting illustrated essays, recording the author's impressions of various parts of Australia. Part I. contains eight chapters devoted to "Glimpses of Australian Life," a generalised account of various aspects of the continent, and is less successful than Part II., which has fifteen chapters descriptive *inter alia* of Melbourne, Adelaide, Broken Hill in 1888, most of the main lines of railway in Queensland and the towns upon them, and of Western Australia.

GENERAL.

[**Geodesy.**]—Astronomische Arbeiten des k. k. Gradmessungs Bureau. Band III. Längenbestimmungen. Wien, F. Tempsky, 1891: 4to pp. 177. [Presented by the Austrian Bureau for Degree Measurement.]

This volume contains three important memoirs on measurements of longitude differences. The first is that between Vienna and Leipzig, carried out by G. von Steeb and L. Weinck in 1873. The time difference between the centres of the observing instruments in Vienna and Leipzig is finally established as 15 min. 37.405 secs. ± 0.019 secs. Similar observations made by Von Oppolzer and M. Loewy in 1874 gave the time interval, Bregenz and Paris, as 29 min. 45.284 secs. ± 0.011 secs. In 1874 also F. Anton and C. von Orff made astronomical observations at Prague and Munich, finding the time difference between the two observatories to be 11 min. 25.817 secs. ± 0.015 secs. The high accuracy of these results, and their importance in giving a basis for the measurement of the degree, amply compensate for the delay in their calculation and publication.

NEW MAPS.

(By J. COLES, *Map Curator, n.o.s.*)

EUROPE.

Bartholomew, John.—Bartholomew's Reduced Ordnance Survey of Scotland. New Series. Sheet 19. Isle of Skye. Scale 1:126,120, or 1·74 geographical miles to an inch. Orographically coloured. John Bartholomew & Co., Edinburgh. Price 2s. mounted on cloth. [Presented by the Publishers.]

Deutsch-französischen Grenzländer.—Karte der —, und Nordost-Frankreichs bis Paris mit genauer Einzeichnung der französischen Befestigungs-Anlagen und deren neueren Verstärkungen. Scale 1:400,000, or 5·5 geographical miles to an inch. Leipzig, Georg Lang. 2 sheets. (*Dulau.*) Price 2s.

Germany.—Indexed Map of —. Scale 1:1,400,000, or 19·1 geographical miles to an inch. With inset plans of Berlin, Potsdam, and environs, and Rhentish-Westphalian Industry and Mining District. Rand, McNally, & Co., Chicago and New York. [Presented by the Publishers, through E. Stanford, Esq.]

Scotland. Bacon's New Sixpenny Series of Popular Maps. Scotland: From the Latest Authorities. Scale 1:792,000, or 10·8 geographical miles to an inch. G. W. Bacon, London.

The outline of this map is inaccurate; the parallels and meridians serve to show how independent it is in many cases of the latest authorities. Roads and railways are frequently misplaced, and changes made many years ago are not noted. There is no indication of the Forth Bridge and its associated lines, and no railway to Gourrock. Many of the most important railway stations are not marked, and the names which appear on the map are mainly those of the old parish churches. The spelling of place-names is archaic, and frequently difficult of identification with the forms currently accepted. Examples of this are Schizhallon, Loch Katherine, Fellew, Robin Hood's Cave. The last is probably intended for Rob Roy's Cave. Such important places for tourists as Beattock, Ardishaig, Milport, Thornton, Bridge of Allan, The Trossachs, Strathpeffer, and Boat of Garten are omitted.

ORDNANCE SURVEY MAPS.

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ENGLAND AND WALES: 161, 165, 217, 279, 283, 286, 294, 348, photo-lithographed edition, 169, 354, 356, engraved, 1s. each.

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AFRICA.

Afrique.—Carte de l'—, à l'échelle de 1:8,000,000, or 111·1 geographical miles to an inch. Publiée par le Service Géographique de l'Armée. Paris, Dépôt de la Guerre. Sheets 1, 2, 3. To be completed in 6 sheets. (*Dulau.*)

AMERICA.

Argentine Republic.—Reisen und trigonometrische Aufnahmen in der Argentinischen Republik in den Jahren 1875–1888, ausgeführt von Prof. Dr. Ludwig Brackenbusch. Nebst Angabe des zur Construction seiner Mapa de la República Argentina im Massstab 1:1,000,000 benutzten Materials. Scale 1:3,000,000, or 41·6 geographical miles to an inch. Tafel 1: Reiserouten und Karten Material. Tafel 2: Grundlinien und trigonometrische Punkte. 'Petermann's Geographische Mittheilungen,' Jahrgang, 1892, Justus Perthes, Gotha. [Presented by the Publisher.]

—Mapa geológica del Interior de la República Argentina, construido sobre los datos existentes, y sus propias observaciones hechas durante los años 1875 hasta 1888, por el Dr. Luis Brackenbusch. Scale 1:1,000,000, or 41·6 geographical miles to an inch. Gotha, Ist. geograph. d. C. Neumann. Five sheets, 41 10s. Three further sheets to be published at a later date, price 61. (Dulan.)

ATLASES.

Johnston, W. & A. K.—Loyal Atlas of Modern Geography. Edited in monthly parts. Part XI, containing maps 16 and 38. W. & A. K. Johnston, Edinburgh and London, 1892. Price 4s. 6d. each part. [Presented by the Publishers.]

Sheet 16 is a map of Belgium and the Netherlands, on which all means of communication are laid down. The system adopted, in this atlas, of colouring all waterways blue is seen to advantage in this sheet, on which so many rivers and canals have to be shown. In addition to the principal map, inset plans are given of Amsterdam and Brussels. Sheet 38 is an excellent map of South Africa, New South Wales, Victoria, and Queensland. As usual, with every issue of the new edition of this atlas, each sheet is accompanied by a copious index.

Universal Atlas, The.—Complete in 28 parts, including index. Published by Cassell & Co., Limited, London, for the Atlas Publishing Company, Limited. Part XVII. Price 1s. each part. [Presented by the Publishers.]

In the present issue of this atlas, sheet 40 is a map of the Grand Duchy of Baden, on which the importance of towns, as regards population, is indicated by spirals, and all railways, main roads, and canals are shown. Sheet 40 is an ethnographic map of Austria-Hungary, in which the colours employed to distinguish the different races are well chosen. Sheets 87 and 88 contain a map of North America, which exhibits the political geography of the continent, and as much of its physical features as the scale will admit of.

PHOTOGRAPHS.

France.—110 photographs of ———. Taken by James Jackson, Esq., in 1891–92. [Presented by James Jackson, Esq.]

This is an interesting series of 110 photographs taken by Mr. James Jackson in the départements of Alpes-Maritimes, Var, and Doubs, and the Jura on the Swiss border. Many of the views, having been selected with great care to illustrate the geological and physical geography of the districts where they were taken, will be of great interest to students.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.





PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*British Guiana; the North-Western District.**

By EVERARD F. IM THURN, M.A., C.M.G.

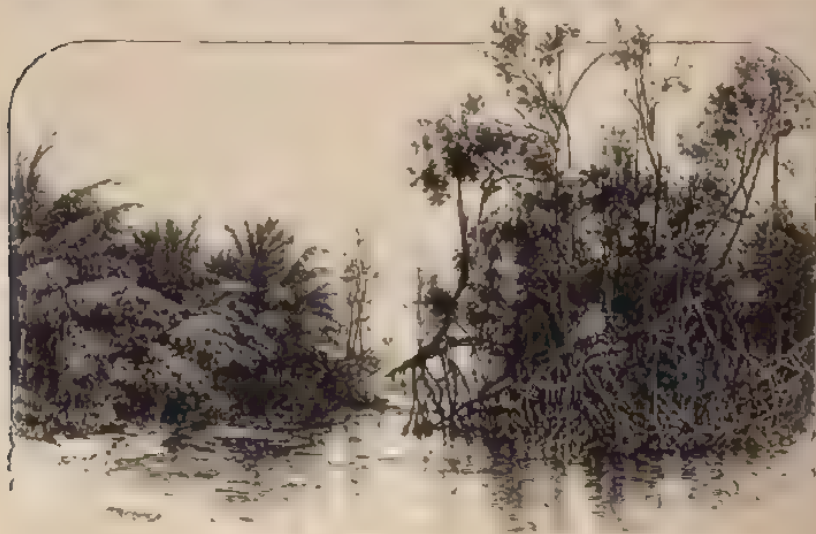
(Read at the Evening Meeting, July 4th, 1892.)

OUR late Assistant Secretary, only a few weeks before he died, in writing to me of what would be my duty to-night, reminded me that I ought chiefly to take geographical description as the basis, working other information in episodically. I have endeavoured to follow his advice. Unlike most travellers, it has been my lot to mark the results of my work, not, in the first place, on paper, with ink and protractor, but with Government stations, with lines of communication connecting these stations, and with the general apparatus of administrative organisation. This has been done over a tract of some 9400 square miles of British territory, before almost unknown, and quite unutilised. My map-making, in this very practical sense, has been on what was, when I first began it in 1883, the unknown north-western portion of our colony of British Guiana. During my nine years' work I have been actively engaged, first, in ascertaining the nature of the country, and then in transforming this from its state of desolate and unbroken swamp, smothered in densest tropical vegetation, and inhabited but by a few Redmen, into an integral part of the colony, with a rapidly-increasing population, and promising to be in the near future one of the busiest and most productive parts of our only possession on the southern half of the continent of America. So rapidly indeed is this transformation now proceeding, that I hesitate to show its results on paper, for the record of one week's work may be rendered worthless by the advances of the next. Yet, just as, concurrently with this actual work which we are carrying on in the new country, we—that is, my staff and myself—are jotting down on temporary ever-changing maps the new developments, so it has seemed to me not ill-advised that I should, while I am here at home in a period of comparative rest, give you an account of what is at the moment being done.

* A general map of British Guiana will be found in 'Proceedings,' 1889, p. 328.
No. X.—OCTOBER 1892.]

A few words as to the geography of Guiana as a whole, and yet fewer as to its history, are necessary as a preliminary; for it must be admitted that knowledge as to British Guiana is neither widespread nor accurate.

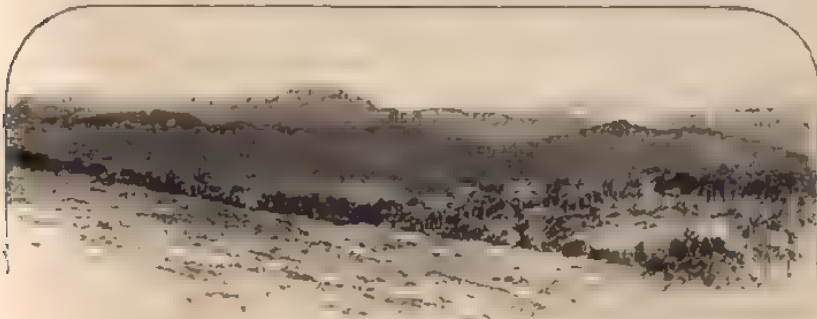
Guiana occupies the shoulder of the South American continent, just at the termination of the long chain of West Indian Islands, which reaches from Florida down to the mouth of the great River Orinoco. British Guiana, the area of which is estimated at about 110,000 square miles, is that part which extends from the mouth of the Orinoco and Venezuela on the north, to the Corantyn River and Dutch Guiana on the south. It stretches from the first to nearly the ninth degree north of the Equator. Its coast region, which consists mainly of a series



MANGROVES AND PALMS AT BARIMA-BAND.

of river deltas, is almost everywhere very low,—indeed, almost invariably below the level of the sea. It is everywhere, except where the hand of man has worked a change, covered by a dense growth of trees, of which so large a proportion are the semi-aquatic, stilt-raised mangroves (*Rhizophora mangle*), or the somewhat similar courida (*Acicennia nitida*), that it requires a careful eye to distinguish the presence of any other species amid the scenery to which these two trees give a very distinctive character. From this low-lying mangrove belt, which may be said to be yet only half land, half sea, there is a gradual, at first scarcely perceptible, rise; but, further inland, the alluvial tract ending at varying distance from the sea, the land rises far more rapidly, in a series of terraces, till it culminates in the comparatively high, dry

table-land which, in Guiana, is called savannah, and which forms so much of the interior of the continent of South America. In the southern part of the colony this highest line is represented by the Pacaraima, or Parima Range, an outlying spur of which is the renowned Roraima, of which I spoke here on a previous occasion. Yet further south are the Kanaku Mountains, these two being practically the only elevations—any part of which is included within the colony—deserving the name of mountains, though almost all existing maps show many others—mere hills exaggerated by the draughtsman into mountains. But in the north of the colony this highest line is only represented by the lower slopes of the Sierra Imataka Range. The limits of British Guiana toward the interior of the continent may roughly be described as corresponding with this line of high land, which naturally also bounds the drainage area of the many considerable rivers of British Guiana. As these mountains themselves are for the most part bare of forest, so also, near their sources, are the banks of the rivers



THE SAVANNAH.

which spring from them. But gradually, along the downward courses of these latter, the trees begin to gather, at first scattered here and there along the banks, then forming a thin line along the water's edge, and lower down, broadening into a forest belt with the ever-increasing width of the streams. At last, in some cases a couple of hundred miles from the sea, the tree fringe of one river merges with the tree fringe of the next, and thus is formed one dense and unbroken forest, which covers with its almost impenetrable tangle the whole of the lower land, and finally passes, almost without interruption, though with some slight, changes in character, into the half-submerged fringe of mangroves which rise on stilted roots from the sea.

How dense this plant-covering of the alluvial soil is would best be shown by a picture of the curious network of mangrove roots, which provides a sort of natural breakwater along the whole coast of Guiana; and as regards the land lying a little further from the sea, by a picture

of the path—three miles in length along which, not more than six months ago, some of us walked, without once touching with our feet, or even seeing with our eyes, the ground, to the houses of a curious tribe of Redmen—Warraus—who lead a semi-aquatic life in those swampy parts.

Such was certainly the general physical character of the whole country now known as British Guiana, to which, in the 16th century, its earliest successful colonists, the Hollanders, came. Though through fear of privateers those at first went up the rivers, yet as soon as this fear was removed, they cast longing eyes on the splendidly rich submerged land of the sea-coast, and, with an experience and skill gained in their Low-Country homes, dammed back the sea along the southern coasts of the colonies, and reclaimed for cultivation a narrow strip of alluvial soil, extending along the sea and river edge, but hardly anywhere more than three or four miles in width. But their work ended northward at the Pomerun River. The whole interior of the country, and even the sea-coast north of the Pomerun—that is, the north-western part of the colony they left as Nature made it. Since the beginning of this century, when the country passed from the hands of the Dutch to those of the English, the latter have rather reduced than extended the area of cultivation; and though they have fairly maintained the quality, the land beyond the narrow belt of cultivation has remained as Nature made it and the Dutch left it.

Yet in this little-known tract northward of the Pomerun there are rivers not inferior to those of the older settled parts of the colony, as well as other excellent natural means of communication, a soil of unsurpassed richness, and, as it now appears, gold in great abundance."

The network of rivers is in itself a natural wonder; the Waini, with its sister, or tributary, the Barama, and the Barima, and the Amakura, all of which, though they have long appeared on our maps, have virtually remained unknown until the last few years, and have remained completely outside the limits of civilisation and settlement. The Waini system and the Barima are wide and deep rivers, affording water-passage for vessels up to 15 or 16 feet draught, for 80 or more miles inland from the sea; the Morawhanna, navigable for equally large vessels, forms a link between these two main rivers. Thus we have one splendid waterway, and many small waterways affording passage to small boats between all the rivers of the district, and between these and the Orinoco on the one hand, and the old civilised portion of the colony on the other. This fact, taken in conjunction with other facts, on which I shall have to dwell presently, seems to promise well for the development of a new industrial district.

Though the Dutch, when they settled, first on the Essequibo and Pomerun, then on the Berbice, and finally on the Demerara, did not attempt anything like a permanent settlement further north than the

Pomerun—even the settlement on that river was only temporary—yet they treated the country between the Pomerun and the Orinoco as—if I may use a modern but expressive phrase—"within their sphere of influence." That is to say, their hucksters and traders passed continually through it, using the network of waterways, which I shall presently describe to you, to trade with the few Redmen inhabiting it, and also to reach, for purposes of trade, the Spaniards living far beyond the Orinoco. These Spaniards themselves took little or no part in this trade; and indeed, from their nearest stations—which were no nearer than the military posts and missions established by them on the left bank of the upper Orinoco—regarded quite complacently the establishment of this Dutch sphere of influence throughout the district extending from the Dutch plantations on the Essequibo to the right bank of the lower Orinoco. Naturally, when the country was transferred from the Dutch to the English, the latter assumed all the rights claimed by the Dutch in those parts—in this sphere of influence as well as in the more populous and better cultivated parts of the colony. Yet later, about 1840, deeming it advisable to lay down a definite and generally recognised boundary in that direction, Sir Robert Schomburgk traversed the district for the only time till quite lately that it has been traversed by an educated man; and as a result he indicated on a map the boundary which natural and historical circumstances seemed to point out as the most convenient. This line of Schomburgk's has recently been used accurately to define the boundaries of the North-Western District, which are, officially, as follows:—On the north the Atlantic Ocean and the mouth of the River Orinoco; on the south the ridge of land between the sources of the Amakura, Barima, and Waini Rivers, and their tributaries, and the sources of the tributaries of the Kuyuni River; on the east, a line extending from the Atlantic Ocean in a southerly direction to the said ridge of land; on the south and on the west, the Amakura River and the line known as Schomburgk's line.

Though the settlements in the Pomerun were, as has been said, among the earliest, if not indeed the earliest, in what is now British Guiana, and though they have never been at any time completely abandoned, yet at no time have they attained the privilege of independent government, as was the case with the settlements on the Essequibo, Demerara, and Berbice Rivers. During the early part of this century there were flourishing settlements and substantial houses for some distance along the right bank, and also at intervals higher up, on both banks of the Pomerun; but of these hardly any record exists. About 1840, at the time of the visit of the brothers Schomburgk, the houses and the cultivation, though still partly existing, were already in decay, and for some time after that date the river remained practically abandoned to Redmen and to squatters. About

twenty years ago there was a revival of agricultural industry by the settlement in those parts of a few Portuguese, and the development in this direction has since then been continuous. The Government of the colony was represented there up to 1872 by an official with somewhat vague powers, handed down from Dutch times, called a Post-holder. With the revival of industry by the Portuguese, this official was modernised into a magistrate. It was to this post that I was appointed in 1882. My jurisdiction extended nominally to the Orinoco; but hardly anyone capable of giving an intelligent account of the country had been beyond the Pomerun, or the small creek, the Moruka—a branch of the Pomerun—on which two missions, one Protestant, the other Roman Catholic, had been established about 1840.

My station on the Pomerun then was the outpost in a north-westerly direction of the civilised part of the colony, and it immediately became my desire to explore the unknown parts of the district under my charge. Taking stock of what had already been done in that direction, I found that the brothers Schomburgk had, between 1835 and 1840, passed a few weeks on the lower parts of the Waini and Barima Rivers; that Messrs. Sawkins and Brown, engaged in making a geological survey of the colony, had, about 1873, passed a few days in the district, on the upper part of the Waini River, and had walked across by a Redman's path and spent one night on the upper part of the Barima; and that, excepting two or three brief, unimportant, and unrecorded excursions into the district by other officials, this was all the exploring that had been done in British Guiana, north of the Pomerun. Even from the Redmen and the black squatters on the Pomerun I found it very difficult to get any information as to the great region beyond; but at last, in January, 1883, though unsuccessful in getting a guide, I started to see for myself what lay within my district beyond the known parts.

From the Pomerun we passed round by sea to the mouth of the Moruka, a narrow stream hardly more than 25 yards wide even at its mouth, which is hidden away among the mangroves. For two or three miles up, the stream, the current of which is immensely strong, is arched over by the boughs of the mangroves rising from a swamp, covered in parts by dense patches of a lovely white lily (*Crinum Commelyni*). The stems and branches of these mangroves are here and there clothed with an orchid with abundant white and pale green sweet-smelling flowers (*Epidendrum ciliatum*). Higher up the mangroves give place to other trees, especially to the manni (*Moronebea coccinea*), with its masses of crimson bud-like flowers, the manicole palm (*Euterpe edulis*), and with great festoons of a creeping palm (*Desmoncus major*), with great clusters of holly-berry-coloured fruits. Some 13 miles up, a small break in the tree fringe of the right-hand bank affords a glimpse of the white sandhill on which stands the



UPPER REACH OF RIVER

English Church mission of Warramuri. The place must have been inhabited long before its use as a mission, which only dates from about 1845, for it is the site of one of the largest of the shell-mounds, or kitchen middens, of the colony. The vast mass of refuse of the meals of former inhabitants, of which this mound is formed, was possibly, I think even probably, deposited by the true Caribs on their warlike raids against the Redmen belonging to the district. That they should always have chosen this same spot for their camp is quite in accordance with the habits of their existing descendants, and with the circumstance that this is the one spot sufficiently dry for camping in the many miles of swamp which lie at the mouths of the neighbouring large creeks of the Manawarin and the Huimaracabra, apparently then, certainly now, the chief homes of the Redmen of the district. Many a tradition remains among these people to the present day of the bloody fights which took place in these parts between the raiders and the inhabitants of the district; and many a more or less pure Carib remains among the inhabitants of the district as the sign of these foreign invaders. The latter found their way to Warramuri by the water path, up which my further journey of exploration to the Waini and the Barima led me.

Starting again from Warramuri, we proceeded up the Moruka, the river narrowing gradually as we went along. Here and there the open savannah, covered with long grass and white lilies (*Crinum Demmelyni*), reached down to the water's edge, each patch of it not unlike a water-meadow at home. And this illusion of the water-meadow was carried out by the fact that at the back of the stretches of savannah small wooded hills bearing thatched houses were seen. These houses are inhabited by the Spanish Arawaks—a curious hybrid group of people of partly Red blood, and in habits and mode of life more Redskin than not. They are the descendants of a body of men, apparently even then of mixed Redskin and Spanish blood, who, during and soon after the Venezuelan war of independence, fled from their original homes on the Orinoco, and sought refuge and protection in British Guiana. The comparatively high ground on the upper Moruka River was assigned to them. There they settled, industriously cultivated the land, and took to themselves wives from among the pure Arawaks of the district. A very few of them have wandered now into the Waini and Barima district: but the greater number remain here on these hills in the original quarters. They are a fine people, almost purely Redskin in their habits, but having a great advantage over the other Redmen in point of industry and permanency of abode. A very few Portuguese have lately settled among them and intermarried with them. Of recent years, it may here be mentioned, though it did not take place till several years after the date of that first visit of mine, a good many of these people have become engaged as

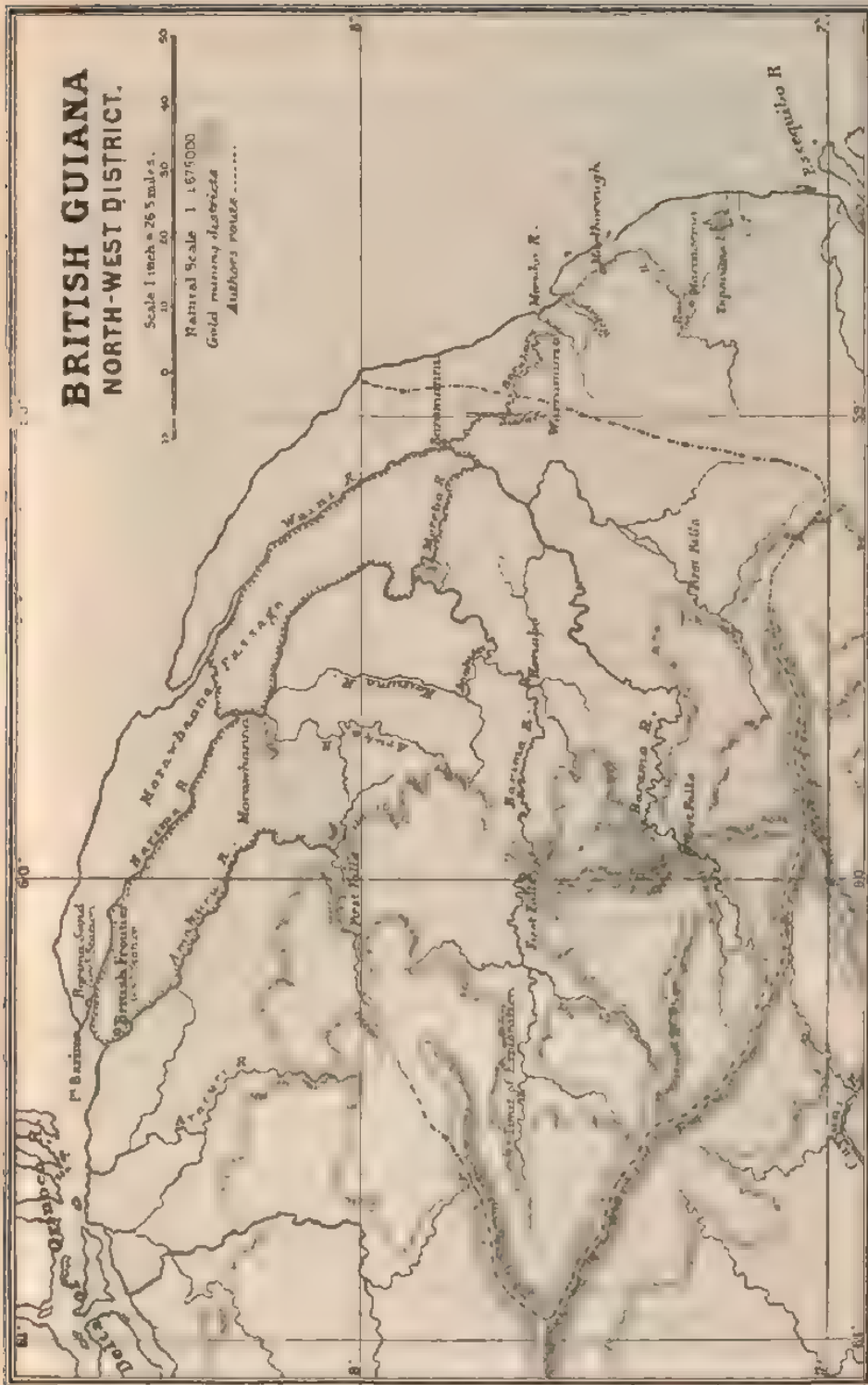
BRITISH GUIANA NORTH-WEST DISTRICT.

Scale 1 inch = 25 1/2 miles.

Natural Scale 1:1675000

Gold mining districts

Ambrosia River



labourers in the gold industry, and, I am afraid, by no means to their advantage.

After five hours' boat journey up the Moruka, the country on each side of the river becoming gradually more and more open—the river at last winding through open savannahs, and broadening out here and there into pools so thickly set with water-lilies that it was difficult to force the boat through them—we reached the point where the waterway leaves the river and passes along a narrow itabbo, or artificial water-path, which connects the Moruka with the Waini River. This connecting passage is in all about 80 miles in length; but only about the first 10 miles of this is actually semi-artificial itabbo, made by the constant passage of the canoes of the Redmen through the swampy savannah. After that it runs into the Barabara and then into the Biara River, which latter runs into the Baramauni River, and that again into the Waini, at a point about 80 miles from its outflow into the sea.

We found the itabbo section of this passage very difficult to get through. Generally, it was hardly wider than the boat, and its many abrupt windings added to our difficulties. Again, the trees hang down so low over the water, that even after we had taken the tent off the boat, we had either to force the boat under the low-lying branches or make a passage by cutting them away. On either side of the channel the ground is so swampy as hardly anywhere to allow foothold of even a few inches in extent. The light hardly penetrates through the dense roof of leaves; and in the gloom under the roof only a few aroids, ferns, lilies, orchids, and great masses of a palm which had at the time of my journey not been described,—though I believe it has since been described by Professor Trail, of Aberdeen, as *Bactris leptospatha*, grow among the fantastically twisted tree-roots which rose from the bare mud. Only close to the channel itself, where just a little more light penetrated, did these same plants grow a little more densely.

This itabbo is quite dry in the longer dry seasons, and is then, of course, impassable; for walking along its banks is out of the question—a circumstance which has had a good deal to do with the fact that the parts beyond had up till then been almost completely shut off from the rest of the colony. Even now, though the overhanging trees have been cleared from this part of the waterway, it presents no slight obstacle to the swarm of gold boats which would press through it to the goldfields beyond.

The itabbo passed, we turned suddenly into the Barabara River itself, at first hardly wider than the itabbo, but soon widening and winding on its course through dense and unbroken bush, chiefly composed of the graceful, ever-arching manicole palms (*Euterpe edulis*). Very abundant, perched high up and low down among this dense bush, were great quantities of an orchid, with stems 8 and 9 feet long loaded with its countless butterfly-like yellow flowers (*Oncidium altissimum*).

Here, too, in the dense shade, clinging close to the undersides of the tree stems, almost dipping into the water, was another very beautiful orchid, with great white and lilac flowers (*Zygopetalum rostratum*), a plant which has, I believe, never been successfully cultivated in England, probably because its habit, which differs considerably from that of most of the other and cultivated species of the genus, has never been understood. After a few miles the Barabara River carried us into the Biara, a river of much the same character, which, though naturally larger than the Barabara, was still so small as hardly to deserve more than the local name of creek. And, again, in a few miles the Biara carried us into the so-called Baramanni River.

The Baramanni, where it is joined by the Biara, is about 100 or 150 yards wide, and very deep. At the time of my first visit, and for long after, I was much puzzled as to how so large a body of water could come from the very narrow strip of land, probably not more than half a dozen miles wide at the most, which it was certain could alone separate the mouth of the Biara from the sea. It is indeed only lately that I have found opportunity, on coming out of the Biara, to turn, not down the Baramanni, but up this river toward what must be its source; and I then found that, quite close to the mouth of the Biara, the Baramanni first widens considerably and then very soon ends abruptly in a narrow streamlet of only a few feet in width—and even this is dry except in the height of the rainy season—connecting the upper end of the wide shallow sheet of water thus formed with the sea. The so-called Baramanni river is, in fact, not a river at all, but a very elongated lake or lagoon, of perhaps 20 or rather more miles in length, the lower end of which opens into the Waini, while the upper end discharges part of its surplus water into the sea.

The lower end of this Baramanni lagoon thus meets the great Waini River at about 80 miles from the sea. In the course of our journey, on reaching this point, instead of turning down towards the sea, we first turned up the Waini, and after a journey of about a day, in the course of which we passed the mouths of two large tributaries, the Moreibo and the Barama, we came to a hill on which some years before my friend, who was in charge of the mission on the Pomorun River, had established a mission for the Redmen of the district, chiefly true Caribs and Akawois. Being unable to visit it often himself, he had placed it under the charge of a Redman, who had received some sort of teaching at the original mission on the Pomorun. But if I may judge from what I saw on that occasion and since, it will take a training extending over several generations before it is possible to produce a Redman capable of taking charge of his fellows in that way.

It was on this journey, close to this mission station of Kwobanne, that for the first and only time in my experience I saw as many as

seven large hon-constrictors sunning themselves, close together, on the banks of the river.

From Kwobanno, a journey of another two days up the now rapidly narrowing river brought us to its first falls, which, though small, are among the prettiest of the many falls in the country. The river falls over a barrier of granite rocks into a circular basin, apparently entirely surrounded by dense-growing, gnarled trees, the twisted branches of which are swathed in a thick clothing of long green moss, among which filmy ferns and some pretty little bright-coloured orchids find a home, and flourish in the continual moisture of the spray. From this fall considerations of time forced me to turn once more down the river, and I have never since had an opportunity of extending my explorations further in that direction; nor has any other white man, I believe, had better luck in this respect, with the possible exception of a gold prospector or two, who have lately made a perfunctory and unsuccessful search for gold in the parts beyond. From information derived from Indians living beyond the falls, it is, however, certain that, as is usually the case, an Indian path or track leads from here, connecting the upper reaches of the Waini with those of the Kuyuni and Barama.

Our journey down the Waini was much more quickly accomplished than had been the ascent; and we soon reached the point where the Waini is joined by its great, and indeed co-equal, branch, the Barama. Up this we turned, and followed its course for seven or eight days, until we reached the falls on this river also. The character of the river is much the same as that of the Waini. Dense and unbroken forest covers its sides on both banks. The ground, after the first day or two, ceased to be below the water level; and the rocky banks rose more or less high on either hand. Often the rock ledges passed right across the river; and when the water is low, the barriers thus formed dam back the water, and form small falls. It is only, however, some 70 miles up that a more considerable rock barrier forms the first falls, called by the Redmen, Dowakaina. It is just a little below these falls that, a few years later, at the mouth of a creek called Takutu, the first gold diggings of the North-Western District grew up.

The River Barama is inhabited solely by true Carib Redmen; these are scattered along its banks in considerable numbers, and were, at the time of my first visit, and to this day remain, despite the growth among them of the gold industry, in a very satisfactorily primitive state. The only other dwellers in that part of the wilderness at that time were two Germans, who were gaining a very precarious livelihood by trading among the Redmen for yams and fowls—almost the only articles procurable from the latter. It is satisfactory to be able to add that these two earliest inhabitants other than Redmen were later the first discoverers of gold in this river.

Re-descending the Barama we then passed into the mouth of the

next large tributary of the Waini, the Moreibo, whence an itabbo, which we followed, leads into the Barima River.

Anything more maze-like than this itabbo between the Waini and Barima Rivers it is impossible to imagine. The route lies along first one, then another—it is almost impossible to guess which—of an uncounted number of tiny tree-smothered sedge-choked water channels, which form an intricate network over the wide stretch of alluvial mud, never dried or lighted by the rays of the sun, which lies between the two rivers. Points of interest, points now hardly discernible in such rays of light as filter through the dense tree-roof, offered themselves in fantastic orchids, shaped and coloured like insects, in glorious butterflies coloured like flowers, seldom enough in birds, now a humming-bird whirring off from its tiny nest in the dense shade, now in a certain small heron gloriously clad in soft purple and grey and dove colour. For two days we wandered, apparently lost, through this dismal swamp, slinging our hammocks at night over the water, between the trunks of the remarkable trillie palm (*Manicaria saccifera*), which there stretches upward some of the most gigantic leaves in the world. At last, more by luck, as it seemed, than by our own skill, our small canoe was forced out into the light and free air of the open Barima River, through wide-spreading towering clumps of sedges, densely matted together with stems of bignonia, heavy with purple and yellow flowers of all shades.

Having left the itabbo for the Barima, we descended the latter river towards the sea, which is some 100 miles distant from that point. Very soon, on the left bank, we passed a large tributary, the Kaituma, which, through another waterway, the Rabbo Amisi, or Anabisi, is again connected with the Barima higher up. And yet a little way below the mouth of the Kaituma we passed, on the same bank, another large tributary, the Aruka, up which—though I did not suspect the fact at the time—had even then been settled for some time a coloured man from the Demerara River, a Chinaman, and a Portuguese. Up this Aruka, too, I later discovered that there still existed a considerable number of Arawaks, who, unlike any other Redmen of the same tribe known to me in Guiana, were in a very primitive state. These Arawaks of the Aruka alone of all the members of their tribe known in Guiana could not speak English, and had retained many of their own customs, which had died out elsewhere in the colony. Thus it was up this river some years later that I first witnessed the curious Arawak game of the Macquari whip, the essential object of which is a test of endurance, blows being given on the calf of the leg sufficiently severe to draw much blood. This extraordinary performance, accompanied with much drinking and with invariable good humour, is carried on for some days in accordance with a fixed ritual. This part of the country must at one time have been the site of a Redskin civilisation far superior to, and very different from, any known previously of the early inhabitants of

Guiana; for there are on it considerable deposits of pottery ornamented with incised patterns, and with grotesque figures of men and animals in very high relief. To estimate the significance of this latter fact, it must be remembered that none of the known early inhabitants of Guiana have advanced in the art of pottery beyond the stage of making vessels of two or three definite and very simple shapes, which are almost invariably without ornament, or are at best, in a very few cases, ornamented with a simple pattern painted on the flat surface. Lastly, as regards the Aruka, it may here be mentioned that it is on it that the chief agriculture of the district has developed since the time of that first visit of mine.

Continuing our course down the Barima, we passed next, but this time on the right bank, the mouth of the Morawhanna, a broad water-channel which, starting from the Barima on its right bank, and at a distance of 49 miles from the sea, runs, after a course of only 8 miles, into the Waini, actually at the sea mouth of the latter river. After passing the mouth of the Morawhanna we saw no considerable side-stream on the Barima until we came to the sand-bank at its mouth. And throughout the 100 miles of the Barima thus traversed we had seen no house or sign of habitation, no human being, until we came to this sand-bank, on which two or three men from the neighbouring Amakuru River were temporarily encamped for the purpose of fishing.

This sand-bank, botanically interesting from the profuse growth of mangroves on it, is noteworthy in the history of geographical exploration, as that on which the brothers Schomburgk, in the course of their historic travels, passed some days while fixing the position of the mouths of the Barima and Amakuru Rivers. But it has evidently much decreased in size since those days. It is also now, some ten years after my first visit, of some interest as the site of a large Government station which I have erected on it, as being the only dry piece of land in those many miles of alluvial swamp, and also as commanding the mouth of the important Barima River.

It was on this sand-bank, too, that I first saw the curious and picturesque shield game of the Warran Redmen—a game played for the purpose of peacefully deciding disputes between any two kindred groups of Warrans. On an appointed day both parties come together on some open space, such as this sand-bank, each man or boy—for all ages take part in it—provided with a large shield made of the leaf-stalks of the aeta palm (*Mauritia flexuosa*). After much shouting and dancing in two opposed lines, the shields of the one party are pushed against those of the other, and by this means the members of each party endeavour by sheer strength to overthrow, or at least to force back from their position, the members of the other party; and the right in the matter in dispute is considered to lie with whichever party proves itself the

stronger in this contest. The game is peculiar to those Warrans who live in the swamps of the mouths of the Orinoco, and subsist here chiefly on the aeta palm, not cultivating any food-stuff, but eating the fruit of this palm and the pith of its stem. They do not, like other Redmen, make any fermented drink, but drink only water and the sap of this same palm, building their houses, not as Humboldt thought, actually in these palms, but yet entirely, floor, posts, and roof, of the various parts of this palm. It might also be added that the greater part of such scanty dress as they wear, and the fibre from which they make their one article of furniture, the hammock, is also derived from the same most useful plant.

Running out to sea from the mouth of the Barima, a four miles' course brought us to the mouth of the Amakuru River, which, according to the line suggested by Schomburgk, would form the boundary between the British and Venezuelan territories. Inside the Amakuru there was at that time not a house to be seen on the English side, though there were two or three cultivated plots, the owners of which, British subjects, lived on the Venezuelan side, which was not then occupied by any Venezuelans. It may be added that, since that time, considerable settlement has taken place at the mouth of this river, on both sides.

A run of two days up the Amakuru, through scenery not differing much from that of the Barima and Waini Rivers, except perhaps in the abundance and great extent of the floating fields of violet hyacinth-like flowered pondweed (*Eichornia* sp.) which block its course, we reached the first falls; and after carrying the boat past these, we reached, in a few hours, the second falls, beyond which the river is so small that no boat can penetrate far.

Retracing our course down the Amakuru and up the Barima to the mouth of the Morawhanna, we passed down the 8 miles' course of the latter river to the mouth of the Waini, and having ascended the latter river for 80 miles without passing a single house, or finding a few feet of dry land on which to rest, we came once more to the mouth of the Baramani, whence we had originally started on the round tour of the Waini and Barima systems, which we had now accomplished. Throughout the journey we had seen but five settlers—two on the Barama and three on the Amakuru; and yet we had seen, with not half a dozen exceptions, all the inhabitants of the district, excepting Redmen.

The physical features of the district thus traversed (which has since come to be known officially as "the North-Western District") are like, yet in some respects different from, those of the rest of the colony. The watershed from which the main rivers, the Waini, Barama, Barima, and the Amakuru, run down to the sea, is here nearer to the coast-line than it is further south. Two important results of this are,

that the bare dry savannah of the interior of other parts of the colony is here unrepresented, the whole district being practically within the forest belt, and that rivers are both shorter and deeper, though their mouths are very wide. Moreover, these rivers are connected both by a remarkably elaborate network, probably hardly paralleled in any other part of the world, of natural and semi-natural water-channels—some of which, as samples of the rest, I have described to you—and by an almost equally elaborate network of Redmen's paths through the forest.

The Amakuru is connected by a waterway on its left bank with the Araturi, a creek of the Orinoco. On its right bank it is similarly connected, or almost connected, with the Aruka, mention of which has already been made as a big tributary of the Barima. The upper part of the Aruka is in its turn connected, both by a waterway and by a path, with the Kaituma, the next large tributary of the Barima, and is also similarly connected with the actual head of the Barima itself. The Barima is connected with the Waini by a path running between the heads of the two rivers, by the itabbo, through which, as I have said, I passed on my first journey, and again lower down by the Morawhanna. This latter is an extraordinary passage, about 100 yards wide, which leaves the Barima at a point 49 miles from the sea, and enters the Waini at the actual sea-mouth after a short course of only 8 miles. As both the Waini and the Barima are large rivers and of very strong current, the Morawhanna is a battlefield between the conflicting tide-systems of the Barima and the Waini. At certain states of the tide this struggle is most marked; but the victory is finally gained by the tide from the Waini. Again, yet another itabbo, connecting the Barima and the Waini Rivers, is marked on Schomburgk's sketch-map, and has thence been adopted into more recent maps. But of this supposed itabbo I can find no trace, and I feel pretty confident it does not exist. The Waini is in its turn connected with the Moruka by the water-channel which I have already described as entering the northern river through the Baramanni. The Baramanni is connected, as has been said, at the upper end of its lake-like expanse with the sea. The upper part of the Moruka too is almost certainly—though of this I have no personal knowledge—connected at its upper end with the sea; and nearer to the coast it is connected, through the Manawarin Creek, an itabbo across the Wokapoa Lake and the Wokapoa Creek, with the Pomerun. The Pomerun is connected, through the Arapiakru Creek and the Tapacuma Lake, with the inhabited part of the coast. Probably in few parts of the world can a more complete network of waterways than this which intersects the North-Western District of British Guiana be found.

The inhabitants of this district, at the time at which I have so far been endeavouring to depict it, were, with the very few exceptions I

have mentioned, Redmen, and Redmen only. The distribution of these within the district is interesting when taken in connection with the distribution of their kind throughout the colony. The Redmen of Guiana consist of many small tribes, the best-known of which are the Arawaks and the so-called Caribs,—true Caribs, as I prefer to call them. The two last-named tribes are best known from the fact that they inhabited the West Indian Islands south of Jamaica at the time of the discovery of these by Columbus; and it is chiefly they who were the victims of that brutal policy of extermination by cruelty, by which the Spanish conquerors of the New World in a few years swept the original inhabitants from the islands. But it would appear that these people, when they were in this fashion discovered, Christianised, and annihilated, were not exactly permanent residents within the islands where they were found, but were part of two hordes of Redmen who had been for some time—perhaps for centuries—and were still actually then migrating from the northern continent of America, down the long line of islands which connects Florida with the country about the mouth of the Orinoco, and on into the Guianas, where they had been for some time establishing themselves, often by force of arms, among tribes, many of whom were their own kindred, and had preceded them along the same line of migration. Such of these Arawaks and true Caribs as were fortunate enough, before they were exterminated, to reach Guiana, found in the Dutch settlers of those parts allies rather than oppressors; and there retained, without encroaching on the narrow strip of sea-shore which the Dutch alone wanted and cultivated, a vast stretch of country, wherein they led, and almost to this day lead, undisturbed lives after the manner and fashion of those ancestors of theirs who were found in the islands by Columbus, and were annihilated by his followers. It must be added, not without due appreciation of the inevitable pathos of the fact, that this phase of peculiar life and habit which has been thus quietly followed for centuries in those parts must now give way before the advance of the fast spreading gold industry.

This is not the place or time in which to dwell in detail on the history of these people; but it will surely not be out of place to sum up here the main facts of this migration into Guiana, especially interesting in this year of the fourth centenary of the discovery of America by Columbus.

Some facts which have recently come to light point to the conclusion that there must have been in those parts a people of considerable civilisation of the higher American type, even before the earliest arrival of the existing Redskin tribes. But with this entirely pre-Columbian people we cannot here deal, and our concern must merely be with the existing tribes.

Of these—though our information does not as yet admit of any definite scientific classification—a serviceable *memoria technica* may



be constructed, partly in accordance with the present geographical distribution of the tribes, as indicative of the order of their arrival in the country, partly in accordance with their more evident ethnic relations. We have good evidence for assuming that the general stream of migration took place down the chain of West Indian Islands, and that, consequently, most of the tribes entered Guiana by way of the mouth of the Orinoco and that North-Western District of which we have been treating.

As regards one of the existing tribes of Guiana, the Warraus, inhabiting the delta of the Orinoco, there is nothing to show that their arrival in Guiana had anything to do with this migration; and there is, on the other hand, a good deal to show that they are distinct from, and inferior in civilisation to, either of the other two great groups now inhabiting this part of the world, *i.e.*, the Caribs and the Arawaks. Pending further investigation, it is, therefore, best to assume that these Warraus are the descendants of a people living in Guiana before the arrival of either the Caribs or Arawaks, and possibly contemporaneously with those more civilised people of whom, as has already been said, little trace remains beyond some artistic fragments of pottery.

Of the two remaining groups of tribes—the Caribs and the Arawaks—the former represented by many tribes now bearing various names; the latter only by the people still known as Arawaks—it may be assumed with some probability that they represent two migratory hordes, distinct from and hostile to each other which almost simultaneously were making their way down the islands at the time when they were discovered by Columbus, as they had been doing for centuries before. Certain facts, chiefly brought forward by my friend Dr. Ernst, of Caracas, seem to indicate that, after they had both followed the same road down the islands for some distance, the Arawaks, apparently a more gentle race, had to yield the road to the more warlike Caribs, turned aside and reached the mainland toward the north of the country now known as Venezuela, and thence distributed themselves overland down through Guiana.

The Carib group, on the other hand, would seem to have kept to the route down the islands, off which they had thus driven the Arawaks, to have entered Guiana by the mouth of the great River Orinoco, and thence to have distributed themselves through Guiana by the various channels of that river and by the intricate network of waterways connecting them with the neighbouring rivers.

The Arawaks having reached the mainland more to the north, seem to have made their way down the sea-coast, and to have settled along the whole coast of Guiana, at no great distance from the sea, everywhere except where the land, as at the actual mouth of the Orinoco, was so swampy as to be left, ungrudged, in the possession of the semi-amphibious Warraus. When, after the Arawaks were

alluvial part of this, the natural desolate wildness of which, not without its own exceeding beauty, I have endeavoured to describe, consists of some of the richest soil in the world. Parts of this which have since been taken in and drained—a task, I may mention incidentally, of no great difficulty—now yield crops of tropical produce in simply amazing abundance. As an illustration of this I may mention that, the garden which, hardly two and a half years ago, I cleared and drained for myself, reclaiming it from the virgin swamp, now already has in it avenues of trees (*Casuarina*) of over 40 feet high, which I then planted. On the other hand, the higher part of the new district is being fast overrun by very successful gold-diggers. But these agricultural and mining enterprises date, the former only some half dozen years, the latter only some three years, back.

All the district as I saw it first was in its original virgin state. Law, if it can be called law, was administered in a decidedly primitive fashion.

It was a fortunate circumstance for me, that when the ordering and organisation of the new district were entrusted to me, I had in it a perfectly new and untouched field to work upon. The country into which I was expected to infuse order was in the state in which Nature had left it, with the single and not very important exception that a few squatters had added themselves since the time of my first visit to the few that I then found in the district. It happened that these had all practically settled themselves round one or other of three separate centres, one at the mouth of the Amakuru, one at the point at which the Morawhanna leaves the Barima, and one at the point at which the Waini River is joined by the Baramanni, and all these, by a sort of process of natural selection, were most suitable as agricultural centres. Three tracts of land, each covering one of these centres of squatting, were accordingly surveyed, and divided into lots, proper titles being given to each squatter for each portion of land taken in by him. By this first step the moral claims of the pioneer squatters to the Crown lands which they had taken in an illegal but enterprising, and therefore meritorious, manner, were recognised, and at the same time plots of land, in accordance with a definite scheme, were prepared for those new agriculturists who were soon attracted to the new district by the new movement within it.

For geographical reasons the obviously most convenient centre from which to administer the district was at the point at which the Morawhanna leaves the Barima; for this is both at about the centre of the waterway which traverses the northern part of the colony from the sugar fields about the mouth of the Essequibo to its northern limits on the Orinoco, and by it, in the absence of roads in the district, all traffic from the Orinoco to the older-established parts of the colony must necessarily pass. Here, therefore, the central station, with the

Government Agency, the Police Barracks, the Hospital, and the other buildings, public and private, which go to make up the chief township, have been placed, and are fast being added to.

Again, for obvious reasons, a large station, with the other necessary accommodation, was placed at the northern end of the waterway, on the mouth of the Amakuru; and other stations, each provided with such accommodation as its special circumstances seemed to require, have been placed at intervals along the whole line.

Due arrangements have been made for the efficient discharge within the district of each Governmental function from this chain of Government stations, which has thus, within the last few years, been stretched along this main waterway, right across the desert, my wanderings through which, in 1883, I have endeavoured to describe to you, and joining the older civilised parts on the Essequibo River with the furthest limits of the colony in a north-westerly direction, on the mouth of the Orinoco. Along this same waterway the fast-growing agriculture of the new district has also naturally settled; while from it, and from its stations, the interior parts of the district, where gold-diggers are at work, are readily reached both by those engaged in that industry, and by the Government officials whose business it is to keep the workers in order.

And now, the district having developed despite its seclusion from the rest of the colony—a seclusion caused by the fact that it was only to be reached by a long, narrow, and intricate waterway, impassable except in the wet season—it has been brought into direct communication with Georgetown by sea.

Meantime, the gold industry, which had begun to establish itself firmly in the older parts of the colony in 1884, and had there, for the first time in history, really caused an exploration and utilisation of the vast waste tract lying away from the sea, had, as is so often the case where that particular industry begins to take hold of a country, been shifting from place to place on the larger tributaries of the Essequibo. In 1884 the gold exported, or at least the gold duly acknowledged as obtained, was only 250 ounces from the whole colony; and this had increased in steady and natural ratio in 1891 to 101,297 ounces. It is perhaps necessary to add, to prevent misunderstanding, that all this gold has been obtained by mere alluvial washing, carried on in a way which must in common fairness be described as most perfunctory by labour which can only be described as extraordinarily unskilled. In quite recent years much more skilful methods have been introduced.

Part of this ever-shifting gold industry, turned aside from its earlier sites on the Essequibo and its tributaries chiefly by the danger and expense involved in the passing of the many falls and cataracts beyond which the goldfields there lie, had, in 1889, been diverted to the Barama River, in the North-West District. Unfortunately, though

the gold lay on this side of the cataracts, the river itself, and, indeed, the whole district, was inaccessible from the more inhabited parts of the country, and the Barama was indeed only to be reached by a long and very tedious journey—in very small boats—of a week or ten days' duration, through the itabbe which I have described. When, therefore, means of communication direct from Georgetown by sea to the centre of the North-Western District at Morawhanna were provided, that part of the gold industry which had already been diverted to the district, and had located itself on the Waini, or rather on its tributary the Baruma, was once more diverted from the Baruma to the other great river of the same district, the Barima, which is easily and readily accessible from Morawhanna. From this latter river, from which the first gold—129 ounces—was obtained only in November, 1889, 2836 ounces were obtained in March 1892. And if this is to be compared with the gold produce of the rest of the colony, it is only fair to add that the results on the Barima have been obtained without the employment of even the small amount of skilled labour which has been used on the older fields of the colony. To make an end, on this occasion, of the subject of gold in Guiana, it should be added that though the metal as yet obtained has been got by means of such primitive instruments as the battel, the tom, and the sluice, from the alluvial mud, there are already signs that the more serious enterprise of quartz-crushing will soon be entered on.

The following discussion ensued after the reading of the paper:—

Mr. PERKINS. In response to your invitation, I may say I am a member of the Survey Department, Demerara, and whilst occupied by duty I have had to visit Mr. im Thurn's district among other places in the colony, and can thoroughly endorse all he has said as to the wonderful changes that have come about since he first went there. Of course the gold industry has given a great impetus to the district, and brought many people from Georgetown. At the same time, a good many people have gone there simply to grow provisions for the Georgetown market; but it is gold that will have to make the place, although it may depend upon agriculture in the end. I have been to most of the gold diggings in the colony, and a curious thing that strikes one, is the fact that they are nearly always situated on the one side of a river. You may see a few claims on the other, but really only on one side are they rich. Thus, on the Potaro most of the gold is on the right bank, on the Essequibo the left, on the Barama the left bank, on the Barima the right bank. The Kuyuni was the first river to be prospected and worked having payable gold diggings, mostly on the right bank. The richest place I have been in is a small creek on the Essequibo, about seven days' journey from Georgetown, including one day's journey up to Bartica. This is the place whence the original holders, with those of the present day, brought down, after two months' work, 212 lbs. of gold. They now bring down 80, 90, or 100 lbs. monthly. It is currently reported that the four men who own it each clear £10,000 a year. The man that found it worked for his food; he had spent all his wages, and owed a lot of money, and two Portuguese asked him to go up again for them to pay off the debt he owed them for food he had had in town. He went up, and was just coming down unsuccessful

and heart-broken, when he sent an Indian into the woods to hunt, who found the creek, and brought back samples of the gold. These were so good that the prospector went in and "located" the creek—as it is called in the colony when you mark out the ground—and from that time he has made money rapidly, until now he is worth £10,000 a year. I believe now the same creek is becoming worked out, unless they get better appliances. One thing I should like to mention. I noticed on the mouth of the Barima River, in the north-west, distinct places that looked as if they were covered with paraffin. It is most noticeable just after the tide goes down, and I think it is really well worth the while of the Government to have borings made to see what is below. This is difficult, as the place is so swampy; and pumps of large capacity would be necessary to keep the place dry. It is a misfortune that the gold diggings have not all been confined to one part of the colony, as their wide distribution takes away public attention from the opening up of the colony. If gold continued to be found in one part, possibly railways or roads might be made to that part; but as it happens, gold is found in so many localities, that to make a permanent railway or to incur any heavy expense does not seem to be justified, as the returns from the different districts fluctuate so much; at one time they may be very large, and then they come down, and another place starts. I really think the Barima district is the most accessible, and as there are no catamarans, it is easily got at, and does not require skilled boatmen. Mr. van Thurn takes care of the people when they come down it, and a steamer brings them to town as soon as they get within measurable distance of Morawhanna.

The President: It only remains for me to say that I think we are very fortunate in having been able to end the session, which has been a very interesting one, by so agreeable a paper as that which we have had from Mr. van Thurn. It is not the first time that he has been good enough to address the Society, and I trust it may not be the last. It is very agreeable to me to be the medium of conveying your thanks to him, and also to Mr. Perkins, who made some very apposite remarks.

*The Hights and Hollows of the Earth's Surface.**

By Professor C. LAPWORTH, M.A., F.R.S., F.G.S.

EVERY tyro in geology is well aware of the fact that the very backbone of geological science is constituted by what is known as stratigraphical geology, or the study of the geological formations. These formations, stratified and unstratified, build up all that part of the visible earth-crust which is accessible to the investigator. Their outcropping edges constitute the solid frame-work, the surface of which forms the physical geography of the lands of the present day, and their internal characters and inter-relationships afford us our only clues to the physical geographies of bygone ages. Within them lies enshrined all that we may ever hope to discover of the history and the development of the habitable world of the past.

These formations are to the stratigraphical geologist what species are to the biologist, or what the heavenly bodies are to the astronomer. It was the discovery of these formations which first elevated geology to the rank of a science. In the working out of their characters, their relationships, their development, and their

* Extracts from the address of Professor C. Lapworth, President of the Geological Section, at the Edinburgh Meeting of the British Association, August, 1892.

origin, geology finds its means, its aims, and its justification. Whatever fresh material our science may yield to man's full conception of nature, organic and inorganic, must of necessity be grouped around these special and peculiar objects of its contemplation.

All the rich store of knowledge we possess respecting the first stage in the life of a geological formation has been derived from a comparison of certain phenomena which the stratigraphical geologist finds in the rock formations of the past, with corresponding phenomena which the physical geographer discovers on the surface of the earth at the present. And all that we know of the second stage again has been obtained in precisely the same way. Surely analogy and common sense both teach us that all which is likely to be of permanent value to us as regards the final stage of elevation and depression must be sought for in the same direction.

Within the last twenty years or so many interesting and vital discoveries have been made in the stratigraphy of the rock formations, which bear largely upon this obscure chapter of elevation and depression. And I propose on this occasion that we try to summarise a few of these new facts, and then, reading them in conjunction with what we actually know of the physical geography of the present day, try to ascertain how such mutual agreement as we can discover may serve to aid the stratigraphical geologist in his interpretation of the true meaning of the geological formations themselves. We may not hope for many years to come to read the whole of this geological chapter, but we may, perhaps, modestly essay an interpretation of one or two of the opening verses.

In the physical geography of the present day we find the exterior of our terraqueous globe divided between the two elements, land and water. We know that the solid geological formations exist everywhere beneath the visible surface of the lands, but of their existence under the present ocean floor we have as yet no absolute certainty. We know both the form of the surface and the composition of the surface of the continental parts of the lithosphere; we only know as yet even in outline the form of its oceanic portions. The surface of each of our great continental masses of land resembles that of a long and broad arch-like form, of which we see the simplest type in the New World. The surface of this American arch is sagged downwards in the middle into a central depression which lies between two long marginal plateaux, and these plateaux are finally crowned by the wrinkled crests which form our modern mountain systems. The surface of each of our ocean floors exactly resembles that of a continent turned upside down. Taking the Atlantic as our simplest type, we may say that the surface of each ocean basin resembles that of a mighty trough or syncline, buckled up more or less centrally into a medial ridge, which is bounded by two long and deep marginal hollows, in the cores of which still deeper grooves sink to the profoundest depths. This complementary relationship descends even to the minor features of the two. Where the great continental sag sinks below the ocean level we have our gulfs and our Mediterranean, seen in our type continent as the Mexican Gulf and Hudson Bay. Where the central oceanic buckle attains the water-line we have our oceanic islands, seen in our type ocean as St. Helena and the Azores. Although these apparent crust-waves are neither equal in size nor symmetrical in form, this complementary relationship between them is always discernible. The broad Pacific depression seems to answer to the broad elevation of the Old World—the narrow trough of the Atlantic to the narrow continent of America.

Every primary wave of the earth's surface is broken up into minor waves, in each of which the ridge and its complementary trough are always recognisable.

The compound ridge of the Alps answers to the compound Mediterranean trough; the continuous western mountain chain of the Americas to the continuous hollow of the Eastern Pacific which bounds them; the sweep of the crest of the Himalaya to the curve of the Indo-Gangetic depression. Even where the surface waves of the lithosphere lie more or less buried beneath the waters of the ocean and the seas, the same rule always obtains. The island chains of the Antilles answer to the several Caribbean abysses; those of the *Ægean Archipelago* answer to the Levantine deeps.

Draw a section of the surface of the lithosphere along a great circle in any direction, the rule remains the same; crest and trough, height and hollow, succeed each other in endless sequence, of every gradation of size, of every degree of complexity. Sometimes the ridges are continental, like those of the Americas; sometimes orographic, like those of the Himalaya; sometimes they are local, like those of the English Weald. But so long as we do not descend to minor details we find that every line drawn across the earth's surface at the present day rises and falls like the imaginary line drawn across the surface of the waves of the ocean. No rise of that line occurs without its complementary depression; the two always go together, and must of necessity be considered together. Each pair constitutes one of those geographical units of form of which every continuous direct line carried over the surface of the lithosphere of our globe is made up. This unit is always made up of an arch-like rise and a trough-like depression, which shade into each other along a middle line of contrary curvature. It resembles the letter S, or Hogarth's line of beauty, and is clearly identical in form with the typical wave of the physicist. Here, then, we reach a very simple and natural conclusion, viz., the surface of the earth-crust of the present day resembles that of a series of crust-waves of different lengths and different amplitudes, more or less irregular and complex, it is true, but everywhere alternately rising and falling in symmetrical pairs like the waves of the sea. This rolling wave-like earth-surface is formed of the outcropping edges of the rock formations which are the special objects of study of the stratigraphical geologist. If, therefore, the physiognomy of the face of our globe is any real index of the character of the personality of the earth-crust beneath it, these collective geographical features should be precisely those which answer to the collective structural characters of the geological formations.

In the earlier days of geology one of the first points recognised by our stratigraphists was the fact that the formations were successive lithological sheets, whose truncated outcropping edges formed the present surface of the land, and that these sheets lay inclined at an angle one over the other; as William Smith quaintly expressed it, like a tilted "pile of slices of bread and butter." But as discovery progressed the explanation of the arrangement soon became evident. The formations revealed themselves as a series of what had originally been deposited as horizontal sheets, lying in regular order one over the other, but which had been subsequently bent up into alternating arches and troughs (*i.e.*, the anticlines and synclines of the geologist), while their visible parts, which now constitute the surface of our habitable lands, were simply those parts of the formation which are cut at present by the irregular plane of the present earth's surface. All those parts of the great arches and troughs formerly occurring above that plane have been removed by denudation; all those parts below that plane lie buried still out of sight within the solid earth-crust, although in every geological section of sufficient extent it was seen that the anticline or arch never occurred without the syncline or trough—in other words, that there was never a rise without a corresponding fall of the stratum. Yet it is only of late years that the stratigraphical geologist has come clearly to recognise the fact that the anticline and syncline must be considered together, and must be

united as a single crust-wave; for the arch is never present without its complementary trough, and the two together constitute the tectonic or orographic unit. *The Fold*, the study of which, so brilliantly inaugurated by Heim, in his 'Mechanismus der Gebirgsbildung,' is destined, I believe, in time, to give us the clue to the laws which rule in the local elevation and depression of the earth-crust, and furnish us with the means of discovery of the occult causes which lie at the source of those superficial irregularities which give to the face of our globe its variety, its beauty, and its habitability.

We may regard such a wave as formed of two parts, the arch-like part above and the trough-like part below. The length of the wave is naturally the length of that line joining the outer extremities of the arch and trough, and passing through the centre node or point of origin of the wave itself, which bisects the line of contrary curvatures. The amplitude of the wave is the height of the arch added to the depth of the trough. Now, the arch-part of such a wave, if perfectly symmetrical, may clearly be regarded as belonging either to a wave travelling to the right, in which case the complementary trough is the one in that direction, or it may be regarded as belonging to a wave travelling to the left, in which case its trough must be the one in that direction. But as in the case of the sea-wave, the advancing slope of the wave is always the steeper, and the real centre of the wave must be half-way down this steeper slope: so there is no difficulty in recognising the centre of a geological fold and its real direction of movement.

The fold of the geologist differs from the ordinary wave of the physicist, essentially in the fact that even in its most elementary conception, as that of a plate bent by a pressure applied from opposite sides, it necessarily includes the element of thickness. And this being the case, the rock-sheet which is being folded and curved has different layers of its thickness affected differently; in the arch of the fold the upper layers of rock-sheet are extended, while its lower layers are compressed. On the contrary, in the trough of the fold the upper layers are compressed and the lower layers are extended. But in both arch and trough alike there exists a central layer, which, beyond taking up the common wave-like form, remains practically unaffected. The geological fold has in addition to length and thickness the further element of breadth, and this fact greatly complicates the phenomena.

Many of the movements which take place in a rock-sheet which is being folded, or in other words, those produced by the bending of a compound sheet composed of many leaves, can be fairly well studied in a very simple experiment. Take an ordinary large note-book, say an inch in thickness, with flexible covers; rule carefully a series of parallel lines across the edges of the leaves at the top of the book, about $\frac{1}{2}$ of an inch apart, and exactly at right-angles to the plane of the cover. Then, holding the front edges loosely, press the book slowly from back and front into an S-like form until it can be pressed no further. As the wave grows it will be noticed that the cross lines which have been drawn on the upper edge of the book remain fairly parallel throughout the whole of the folding process, except in the central third of the book, where they arrange themselves into a beautiful sheaf-like form, showing how much the leaves of the book have sheared or slid over each other in this central portion. It will also be seen when the S is complete that the book has been forced into a third of its former breadth. It is clear that the wave the book now forms must be regarded as made up of three sections, viz., a section forming the outside of the trough on the one side, and a section forming the outside of the arch on the other, and a central or common section, which may be regarded either as uniting or dividing the other two.

As this experiment gives us a fair representation of what takes place in a geological fold, we see at a glance that the geologist is forced to divide his fold into three parts—an arch limb, a trough limb, and a middle limb—which latter we may call the *copula* or the *septum*, according as we regard it as connecting or dividing the other two. Our note-book experiment, therefore, shows us also that in the trough limb and the arch limb the leaves or layers undergo scarcely any change of relative position beyond taking on the growing curvature of the wave. But the layers in the central part, or *septum*, undergo sliding and shearing. It will be found also, by gripping the unbound parts of the book firmly and practising the folding in different ways, that this *septum* is also a region of warping and twisting. This simple experiment should be practised again and again until these points are apparent, and the various stages of the folding process become clear; the surface of the book being forced first into a gentle arch-like rise with a corresponding trough-like fall, then stage by stage the arch should be pushed over on to the trough until the surfaces of the two are in contact, and the book can be folded no further.

In the structure of our modern mountain ranges we discover the most beautiful illustrations of the bending and folding of the rocky formations of the earth-crust. The early results of Rogers among the Alleghanias, of Lory and Favre in the Western Alps, have been greatly extended of late years by the discoveries of Heim Baltzer in the Central Alps, of Bertrand in Provence, of Dutton and his colleagues in the western ranges of America, and of Peach and Horne and others in the older rocks of Britain. The light these researches throw upon the phenomena of mountain structure will be found admirably summarised and discussed in the works of Leconte, of Dana, of Heim, and finally, in the magnificent work of Suess, the '*Antlitz der Erde*,' of which only the first two volumes have yet appeared.

Looking first at the mountain fold in its simplest form, as that of a bent rock-plate, composed of many layers which have been forced into two similar arc-like forms, the convexities of which are turned, the one upwards and the other downwards, we find in the present mountain ranges of the globe every kind represented. We commence with one in which the arch is represented merely by a gentle swell of the rock-sheet and the trough by an answering shallow depression, the two sliding into each other in an area of contrary flexure. From this type we pass insensibly to others, in which we see that the sides of the common limb or *septum* are practically perpendicular. From these we pass to folds in which the twisted common limb or *septum* overhangs the vertical, and so on to that final extreme, where the arch limb has been pushed completely over on to the trough limb, and all three members, as in our note-book experiment, are practically welded into one conformable solid mass.

Although the movements of these folds are slow and insensible, and only effected in the course of ages, so that little or no evidence of the actual movement of any single one of them has been detected since they were first studied, yet it is perfectly plain that when we regard them collectively we have here crust-folds in every stage of their existence. Each example in itself represents some one single stage in the lifetime of a single fold. They are simply crust-folds of different ages. Some are, as it were, just born; others are in their earliest youth. Some have attained their majority; some are in the prime of life; and some are in the decrepit stages of old age. Finally, those in which all three members—arch limb, trough limb, and *septum*—are crushed together into a single mass, are dead. Their life of individual movement is over. If the earth-pressure increases, the material which they have packed together may of course form a passive part of a later fold, but they themselves can move no more.

We see that every mountain fold commences first as a gentle alternate elevation

and depression of one or more of the component sheets of the geological formations which make up the earth-crust. This movement is due apparently to the tangential thrusts set up by the creeping together, as it were, of those neighbouring and more resistant parts of the earth-crust which lie in front of and behind the moving wave. Yielding slowly to these lateral thrusts, the crest of the fold rises higher and higher, the trough sinks lower and lower, the central common limb grows more and more vertical, and becomes more and more strained, sheared, and twisted. As this middle limb yields, the rising-arch part of the fold is forced gradually over on to the sinking trough, until at last all three members come into conformable contact, and further folding as such is impossible. Movement ceases; the fold is dead. We see also from our note-book experiment that the final result of the completion of the fold is clearly to strengthen up and consolidate that part of the crust-plate to the local weakness of which it actually owed its origin and position. The fold has by its life-action theoretically trebled the thickness of that part of the earth-plate in which its dead remains now lie. If the lateral pressure goes on increasing, and the layers of the earth-crust again begin to fold in the same region, the inert remains of the first fold can only move as a passive part of a newer fold: either as a part of the new arch limb, the new trough limb, or the new septum. As each younger and younger fold formed in this way necessarily includes a more resistant, and therefore a thicker, broader, and deeper sheet of the earth-crust, we have here the phylogenetic evolution of a whole family of crust-folds, each successive member of which is of a higher grade than its immediate predecessor.

It very rarely happens that the continuous plate in which any fold is imbedded is able to resist the crust-creep until the death of the first fold. Usually, long before the first simple fold is completed, a new and a parallel one rises in front of it on the side of the trough limb, and the two grow, as it were, henceforward side by side. But the younger fold, being due to a greater pressure than the older, must of necessity be of a higher specific grade, and the two together form a generic fold in common. Our present mountain systems are all constituted of several families of folds, all formed in this way of different gradations of size, of different dates of origin, and of different stages of life evolution; and in each family group the members are related to each other by this natural genetic affinity. Sometimes the new folds are formed in successive order on one side of the first fold, and then we have our unilateral (or so-called unsymmetrical) mountain groups, like those of the Jura and the Bavarian Alps. Sometimes they are formed on both sides of the original fold, and then we have our bilateral (or so-called symmetrical) ranges, like the Central Alps. In both cases the septa of the aged or dead folds are if necessity all directed inwards towards the primary fold. If, therefore, they originate only on one side of the fold, our mountain group looks unsymmetrical, with a very steep side opposed to a gently sloping side. If they grow on both sides of the original fold, we have the well-known "fan structure" of mountain ranges. In this case the whole complex range is seen at a glance to be a vast compound arch of the upper layers of the earth-crust, keyed up by the material of the dead or dying folds, which by the necessities of the case constitute mighty wedges whose apices are directed inwards towards the centres of the system. But a complete arch of this kind is in reality not a single fold, but a double one, with a septum on both sides of it, and it requires two troughs, one on each side of it, as its natural complement. The so-called unsymmetrical ranges, therefore, which are constituted merely of arch limb, trough limb, and septum, are the more natural and the more common.

It is clear that in the lifetime of any single fold its period of greatest energy and most rapid movement must be that of middle life. In early youth the lateral

pressure is applied at a very small angle, and the tangential forces act, therefore, under the most disadvantageous circumstances. In the middle life of the fold the arch limb and the trough limb stand at right angles to the septum, and the work of deformation is then accomplished under the most favourable mechanical conditions and with the greatest rapidity. That is to say, the activity of the fold and the rate of movement of the septum, like the speed of the storm wind, varies directly as the gradient.

In our note-book experiment we observed that little or no change took place in the arch limb and trough limb, while the septum became remarkably sheared and twisted. The same is the case in nature; but here we have to recollect that these moving mountain folds are of enormous size; indeed, actual mountains in themselves. These great arches, scores of miles in length, thousands of feet in height and thickness, must of necessity be of enormous weight, capable of crushing to powder the hardest rocks over which they move, while the thrust which drives them forward is practically irresistible. It is plain, therefore, that while the great arch limb and the trough limb of one of these mighty folds move towards each other from opposite directions, they form together an enormous machine, composed of two mighty rollers or mill-stones, which mangle, roll, tear, squeeze, and twist the rocky material of the middle limb or septum, which lies jammed in between them, into a laminated mass. This deformed material, which is the characteristic product of the mountain-making forces, is, of course, made up of the stuff, or the original middle limb of the fold; and whether we call it breccia, mylonite, phyllite, or schist, although it may be composed of sedimentary stuff, it is certainly no longer a stratified rock; and though it may have been originally purely igneous material, it is certainly no longer volcanic. It is now a manufactured article, made in the great earth-mill.

These mountain folds, however, are merely the types of folds and wrinkles of all dimensions which affect the rock formations of the earth-crust. Within the mountain chains themselves we can follow them fold within fold, first down to formations, then to strata, then to laminae, till they disappear at last in the microscopic minuteness beyond the limits of ordinary vision. Leaving these, however, for the moment, let us travel rather in the opposite direction, for these mountain folds are by no means the largest known to the stratigraphical geologist. Look at any geological section crossing our type continent of North America, and it will be found that the whole of the Rocky Mountain Range on its western side and the Alleghany Ranges on the other are really two mighty compound geological anticlines, while the broad sag of the Mississippi Basin is actually a compound geological syncline made up of the whole pile of the geological formations. That is to say, the continent of North America is composed of a pair of geological folds, the two arches of which are represented by the Rockies on the one side and the Alleghanies on the other, while the intermediate Mississippi syncline is the common property of both. Here, then, we reach a much higher grade of fold than the orographic, or mountain-making fold, viz., the plateau-making fold, or the semi-continental fold, which, because of its enormous breadth, must include a very much thicker portion of the earth-crust than the ordinary orographic fold itself.

It must be the steeper sides of each of the two folds, namely, those which face the ocean, which must be the real middle limb; the septal areas where most work is being done and the motion is greatest. How perfectly this agrees with the geological facts goes without saying. It is on the steep Pacific side of the western fold that the crushing and crumpling of its rocks is the greatest. It is on the Atlantic side of the eastern fold that the contortion and metamorphism of its rocks are at their maximum, while in the common and gently sloping trough of both folds,

namely, the intermediate, the Mississippi Valley, the entire geological sequence remains practically unmodified throughout.

Taught by our study of the mountain wave, we know that the more active of these two American folds at the present day must be that fold whose septum has the steeper gradient. Geology and geography flash at once into combination. The steeper Pacific septum of the western fold from Cape Horn to Alaska is ablaze with volcanoes, while the gently-inclined Atlantic septum of the eastern fold from Greenland to Magellan Straits shows none, except on the outer edge of the Antilles, at the very point where the slope of the earth-surface is the steepest. We see at a glance that the vigour of these two great continental folds, like those of our mountain waves, varies directly as the surface gradient of the septum.

The geographical surface of North America, considered as a whole, is a reality that of a double arch, with a sag or common trough in the middle. We have seen already that this double arch must be regarded as the natural complement of the equally double Atlantic trough. Here, then, if the path of analogy we have hitherto so triumphantly followed up to this point is still to guide us, the basin of the Atlantic must be, not only in appearance but in actuality, formed of two long minor folds of the same grade as the two that form the framework of America, but with their members arranged in reverse order. If so, their submarine septa ought also to be lines of movement and of volcanic action. And this is again the case. The volcanic islands of the Azores and St. Helena lie not exactly on the longitudinal crests of the mid-oceanic *Challenger* ridge, but upon its bounding flanks. We have not yet, however, finished with our simple folds. If we draw a line completely round the globe, crossing the Atlantic basin at its shallowest, between Cape Verde to Cape St. Roque, and continue it in the direction of Japan, where the Pacific is at its deepest, as the trace of a great circle passing completely round the globe, we find that we have before us a crust-fold of the very highest and grandest order. We have one mighty continental arch stretching from Japan to Chili, broken medially by the sag of the Atlantic trough, and this great terrestrial arch stands directly opposed to its natural complement, the great trough of the Pacific, which is bent up in the middle by the mightiest of all the submarine buckles of the earth-crust, on whose crest stand the oceanic islands of the central Pacific. If this be true, then the septum of all septa on our present earth-crust must cross our grandest earth-fold where the very steepest gradient occurs along this line, and it must constitute the centre-point of the moving earth-fold, and of greatest present volcanic activity. And where is this most sudden of all depressions? Taught once more by our geological fold, the answer is instantaneous and incontrovertible. It is on the shores of Japan, the region of the mightiest and most active of all the living and moving volcanic localities on the face of our globe.

The line which we indicated as forming our grandest terrestrial fold returns upon itself. It is an endless fold, an endless band, the common possession of two sciences. It is geological in origin, geographical in effect. It is the *wedding-ring* of geology and geography, uniting them at once and for ever in indissoluble union. Such an endless fold must have an endless septum, which, in the nature of things, must cross it twice. It is needless to point out that if we unite the Old and New Worlds and Australia, with their intermediate sags of the Antarctic and Indian Oceans, as one imperial earth-arch, and the unbroken watery expanse of the Pacific as its complementary depression, the circular coastal band of contrary surface flexure between them should constitute the moving master septum of the earth-crust. This is the "volcanic girdle of the Pacific," our "terrestrial ring of fire."

Or, finally, if we rather regard the compact arch of the Old World itself as the natural complement of the broken Indo-Pacific depression, then the most active

and continuous septal band of the present day should divide them. Again our law asserts itself triumphantly. It is the great volcanic and earthquake band on which are strung the Frætoon Islands of Western Asia, the band of Mount St. Elias, the Aleutians, Kamtschatka, the Kuriles, the band of Fusijama, Krakatoa, and Sangir. The rate of movement of the earth's surface doubtless everywhere varies directly as the gradient.

We find, therefore, that even if we restrict our observations to the most simple and elementary conceptions of the rock-fold as being made up of arch limb, trough limb, and twisting but still continuous septum, we are able to connect, in one unbroken chain of causation, the minutest wrinkle from the finest lamina of a geological formation with the grandest geographical phenomena of the face of our globe. We find precisely as we anticipated that the wave-like surface of the earth of the present day reflects in its entirety the wave-like arrangement of the geological formations below. On the land we find the surface arches and troughs answer precisely to the grander regional anticlines and synclines of the subterranean sedimentary sequence; and it may, I believe, be regarded as certain that the submarine undulations have a similar relationship. We find in the new geology, as Hutton found in the old, that geography and geology are one. We find, as we suspected, that the physiognomy of the face of our globe is an unerring index of the solid personality beneath. It bears in its lineaments the characteristic family features and the common traits of its long line of geological ancestry.

Such, it seems to me, is an imperfect account of the introductory paragraphs of that great chapter in the new geology now in course of interpretation by geologists of the present day; and we have translated them exactly in the old way by means of the only living geological language, the language of present natural phenomena, and I doubt not that sooner or later the rest of this great chapter will be read by the same simple means. I have confined myself to-day to the discussion of the characteristics of the simple geological fold as reduced to its most elementary terms of arch, trough, and unbroken septum; for this being clearly understood, the rest naturally follows. But this twisted plate is really the key which opens the entire treasure-house of the *New Geology*, in which lie spread around in bewildering confusion, facts, problems, and conclusions enough to keep the young geologist and other scientists busily at work for the next half-century.

The account of the simple rock-fold I have already given is of the most elementary kind. It presupposes merely the yielding to tangential pressure from front and back, combined with effectual resistance to sliding. But in the layers of the earth-crust there is always in addition a set of tangential pressures theoretically at right angles to this. The simple fold becomes a folded fold, and the compound septum twists not only vertically but laterally. On the surface of the globe this double set of longitudinal and transverse waves is everywhere apparent. They account for the detailed disposition of our lands and our waters, for our present coastal forms, for the direction, length, and disposition of our mountain-ranges, our seas, our plains, and lakes. The compound arch becomes a dome, its complementary trough becomes a basin. The elevations and depressions, major and minor, are usually twinned, exactly like the twins of the mineralogist, the complementary parts being often inverted, and turned through 180° (compare Italy with the Po-Adriatic depression). Every upward swirl and eddy has its answering downward swirl. The whole surface of our globe is thus broken up into fairly continuous and paired masses, divided from each other by moving areas and lines of mountain-making and crust-movement, and the surface of the earth of the present day seems to stand midway in its structure and appearance between the sun and the moon, its eddies wanting the mobility of those of the one and the symmetry of those of the other.

In the geology of the earth-crust, also, the inter-crossing of the two sets of folds, theoretically at right angles to each other, gives rise to effects equally startling. It lies at the origin of the thrust-plane or over-fault, where the septal region of contrary motion in the fold becomes reduced to, or represented by, a plane of contrary motion. It allows us to connect together under one set of homologous folds and faults. The downthrow side of the fault answers to the trough, the upthrow side to the arch, of our longitudinal fold, while the fault-plane itself represents the septal area reduced to zero. The node of the fault, and the alternation and alteration of throw, are due to the effects of the transverse folding. These transverse folds of different grades, which affect different layers of the earth-crust differentially, account also for the formation of laccolites, of granitic cores, and of petrological provinces. They enable us also to understand many of the phenomena of metamorphism.

I must frankly admit that the primal cause of all this tangential movement and stress is still as mysterious to me as ever. I incline to think that it is due to many causes—tides, sedimentation, and many others. Is it, however, after all, *mainly* the result of the contraction in diameter of our earth, due to the loss of its original heat into outer space? For every where we find evidences of symmetrical crushing-in of the earth-crust by tangential stresses. Everywhere we find proofs that different layers of that crust have been affected differentially, and the outer layers have been folded the most. We seem to be dealing, not with a solid globe, but with a globular shell composed of many layers.

Is it not just possible that our earth is such a hollow shell, or series of concentric shells, on the surface of which gravity is at a maximum, and in whose deepest interior it is practically non-existent? May this not be so, also, in the case of the sun, through whose spot-eddies we possibly look into its hollow interior? If so, perhaps our present nebulae may also be hollow shells formed of meteorites; on the surfaces of these shells the fiery spirals we see would be the swirls which answer to the many twisting crustal septa of the earth. Our comets, too, in this case might be elongated ellipsoids, whose visible parts would be merely sheets of differential movement. In this hypothetical case we have represented before us to-day all the past of our earth as well as its present. Uniformity and Evolution become one.

Thus from the microscopic septa of the laminae of the geological formations we pass outwards in fact to these moving septa of our globe, marked on land by our new mountain-chains, and on the shores by our active volcanoes. Thence we sweep, in imagination, to the fiery eddies of the sun, and thence to the glowing swirls of the nebulae; and so outwards and upwards to that most glorious septum of all the visible creation, the radiant ring of the Milky Way.

Lieut. Peary's North Greenland Expedition.

THE North Greenland expedition of 1891-92, under the command of Lieut. Robert E. Peary, U.S.N., returned on September 11th to St. John's, Newfoundland, the whole of the party, with one exception, being safe and well. The object of this expedition, it will be remembered, was to penetrate by land as far north as possible, in order to ascertain the extent and trend of the north coast of Greenland. The headquarters of the expedition were fixed at McCormick Bay, on the west

coast of Greenland, about 78° N. The first work undertaken by Lieut. Peary, on the departure of the *Kite* from McCormick Bay last year, was the construction of a house to afford them protection for the long Arctic winter. After some short boating and sledging expeditions, for the purpose of exploring the neighbourhood of McCormick Bay and Inglesfield Gulf, all further exploring work was brought to an end, and the severity of the weather necessitated going into winter quarters, where they had laid in a good supply of provisions, consisting of thirty-one reindeer, several seals and walrus, and several hundred birds.

The natives came and settled near them, and the winter was passed in the preparation of deer-skins, and making fur clothing, sledges, ski, and other articles of equipment. The return of the sun in the middle of February was marked by a furious storm, accompanied by torrents of rain, which washed the snow away, and nearly flooded the house. During March and April the weather was fine, though the temperature was between 40° and 50° below zero, and advantage was taken by the members of the expedition of this opportunity for ski- and snow-shoe practice. In the middle of April the leader of the expedition, accompanied by Mrs. Peary, made an excursion with the dog-sledge to Whale Sound, and returned to the house after travelling some 250 miles. Preparations were now hastily pushed on for making the long journey northward, which was commenced on May 15th, 1892, at which time the party was composed of four members and sixteen dogs. On May 24th the edge of the great basin of the Humboldt Glacier, about 130 miles from McCormick Bay, was reached, and here two of the party were sent back with two of the dogs, Lieut. Peary and Mr. Astrup proceeding with the remainder. At midnight of May 31st the explorers looked down into Petermann Fiord from the edge of its great glacier, and eight days later had reached the head of St. George's Fiord. The further progress of the party was much delayed by storms, fogs, crevasses, and steep ice-slopes. On June 26th lat. 82° N. was attained, when the land which Lieut. Peary had been keeping in view to the north-west was observed to trend away to the north-north-east, then to the east and south-east. After marching four days to the south-east, the land still extending south-east and east, the party made direct for a large opening in the mountains, which was reached on July 1st.

On July 4th, after three days' travel, the head of a great bay was reached in lat $81^{\circ} 37'$ N., long. 34° W., opening out east and north-east, which was named by Lieut. Peary Independence Bay, in honour of the day, and a great glacier flowing north into it, Academy Glacier. The inland ice was again reached on July 7th, at which time both men and dogs were much exhausted and footsore. The land in this region was observed to be red and brown in colour, and almost entirely free from snow. It was covered with glacial *débris* and sharp stones of all sizes. Flowers, insects, and musk oxen were abundant, while traces of foxes,

hares, ptarmigan, and possibly wolves were seen. The surface of the bay was covered with the unbroken ice of the last winter.

The start for the return journey was made July 9th, and in seven days the explorers had reached a height of 8000 feet, and were struggling through soft snow and enveloped in mist, in which they remained for some fourteen days, and then descended east of the Humboldt Glacier. From this point the return journey was made at 30 miles a day until McCormick Bay was reached on August 4th, and the relief party sent in the *Kite* met with.

The most important result of Lieut. Peary's expedition is the light it throws on the configuration of the coast of Greenland between Cape Washington, the most northerly point reached on the west coast, and the spot on the east coast where land is reported to have been seen in 1670. The position of Cape Washington is about $83^{\circ} 30' N.$, $39^{\circ} W.$, that of the reported land on the east coast about $78^{\circ} 30' N.$, $19^{\circ} W.$, the distance between them roughly 350 geographical miles. Independence Bay lies about one-third of the way from Cape Washington towards the reported land, and its discovery, as well as the statements of Lieut. Peary regarding the direction of the coast wherever he saw it, are powerful evidence in favour of the insular nature of Greenland.

Another fact bearing on the same point is, that though all the northern fiords had glaciers flowing into them, the continental ice-cap was found to terminate at the Victoria Inlet in about lat. $83^{\circ} 30' N.$ on the west coast. Valuable tidal and meteorological observations were also obtained, as well as a quantity of material for the ethnological study of the Northern Eskimo, photographs, costumes, and implements, and considerable zoological and botanical collections.

GEOGRAPHICAL NOTES.

The New Session.—The Session of 1892-3 will begin on Monday, November 14th. For the ordinary evening meetings several important papers are promised. The Session will be opened by Dr. Nansen, who will describe the programme of his expedition for the exploration of the North Polar Region. It is expected that several eminent Arctic authorities will be present to discuss Dr. Nansen's programme. Mr. Joseph Thomson has so far recovered as to feel justified in promising to give us an account of his recent expedition to Lake Bangweulu, probably at the meeting of November 28th. It is possible that Captain Bower may come home from India in time to read a paper on his important journey across Tibet at one of the December meetings. Other papers which are expected to occupy early meetings are:—"A Journey Across the Island of Yesso," by Professor Milne, F.R.S., and "A Voyage Round

the Island and up its Rivers," by Mr. Savage Landor; "The Siyin Chins," by Major Rundall; "A Visit to the Chatham Islands," by Mr. H. O. Forbes; "Journeys in Benin," by Captain Gallwey. Other papers promised or expected will be by the Prince of Monaco, on his "Researches into the Currents of the North Atlantic"; Mr. W. M. Conway, on his adventurous expedition to the Karakorum; Professor Bouney, on "The Work of Glaciers on the Earth's Surface"; Sir Archibald Geikie, on "Types of Scenery"; Dr. Schlichter, on "Photography applied to Celestial Observations"; Mr. J. W. Wells, on "A Recent Journey in the Island of Santo Domingo"; Mr. J. Y. Buchanan, on "The Windings of Rivers"; Mr. Wilkinson, on "The Kalahari Desert." Besides the evening meetings, the dates of which will be found on the usual card, it will probably be necessary to hold other meetings, the dates of which will be duly announced in the usual place on the cover of the 'Proceedings.' In addition to the meetings at which these papers will be read, it has been arranged to give a series of Educational Lectures, under the auspices of this Society. These lectures will be given in the theatre of London University, by Mr. H. J. Mackinder, M.A., Reader in Geography at the University of Oxford. The series will consist of ten lectures, beginning on the third Friday of January, and continued on successive Fridays until completed. For students desirous of having special instruction in connection with these lectures, Mr. Mackinder will have the co-operation of our Librarian, Dr. H. R. Mill. It is also hoped that arrangements will be made for a series of four Christmas Lectures for young people. Detailed programmes, both of the ordinary meetings and of the special lectures just referred to, will be issued in due time.

The Columbus Celebrations.—The *fêtes* held at Genoa, in September, celebrating the fourth centenary of Columbus' discovery, will be referred to in the November number. Meanwhile, we give an account, kindly forwarded by the captain of one of Her Majesty's ships, of the proceedings at Huelva, where a great naval display was held from July 31st to August 5th. The caravel *Santa Maria* was the central feature of the proceedings during this *fête*. Much trouble was taken to build this frigate on the same lines and of the same size as the original *Santa Maria* in which Columbus made his celebrated voyage. She is 75 feet long, has 28 feet beam, and her displacement is calculated at about 200 tons. She is built with a large overhanging forecastle, the deck of which slopes steeply towards the waist of the ship when she is on an even keel. There are high openwork bulwarks round both forecastle and poop. The poop covers all the after-part of the ship, and comes nearly as far forward as the mainmast; under it are placed the tiller and relieving tackles. On the poop and extending across the deck is a cabin, which is a copy of that occupied by Columbus. The door is placed on the star-

board side. Fore and aft on the port side is a wooden bed-place, strongly built, and covered with a red silk coverlet. The walls are decorated with pictures and trophies of arms and armour, also the astrolabe and cross-staff. The caravel is armed with four small carronades on the upper deck and four breech-loading guns on the gunwale; in the latter the whole of the cup-shaped breech-piece lifts out and the charge is placed in it; it is then replaced, and the gun is ready for action. The *Santa Maria* has a bowsprit, three masts, and is rigged with spritsail-yard under the bowsprit, fore-yard, main-yard, maintopsail-yard, and crossjack-yard. The four first-named yards have, of course, square sails, and the crossjack-yard a triangular sail, which hauls out to a bumpkin over the stern. The main-mast has a military top with high sides. The crew consists of sixty men and officers. The *Santa Maria* was built at Cadiz, was launched on July 30th, and towed to Huelva. She was accompanied by all the war-vessels, both Spanish and foreign, whose draught of water would permit them to cross the bar of Huelva. At Huelva the fleet anchored in the River Odiel, opposite the town. About 5 miles to the S.E. is the small town of Palos, on the tributary River Tinto, whence Columbus sailed on August 3rd, 1492. On August 2nd the caravel made sail, and passed down the river on her way to Palos; but the wind failing, she had to be taken in tow by a steamer. At 6 A.M. on the 3rd the caravel weighed, and was towed down the river, accompanied by the ships which had come with her from Cadiz; on the previous evening the larger foreign vessels from Cadiz had accompanied the Spanish squadron of heavy ships, and had anchored off the bar at Huelva. The countries represented were Great Britain, the United States, France, Italy, the Argentine Republic, Portugal, and Mexico. As the caravel approached all ships dressed with flags and weighed; the Spanish vessels were stationed on the left and the foreign vessels on the right as the caravel came out over the bar. She was towed between the lines of ships, every ship firing a salute of twenty-one guns, and cheering as she passed. All the ships followed the *Santa Maria* round for about two miles, when she again headed in for the bar, and another royal salute was fired by every vessel present. On the evening of the 4th a state banquet was given at Huelva by order of the Queen Regent. The Minister of Marine presided, and covers were laid for 350. Officers from all the foreign ships were present. On the 6th most of the foreign ships sailed from Huelva and Cadiz. A large monument is in course of construction at Palos, and a garden and promenade have been laid out at the Convent of La Rabida, near the town. At Cadiz a promenade garden has also been opened in commemoration of the event. These will be inaugurated in October by the Queen Regent. After the Queen's visit the *Santa Maria* will start for Havana, whence she will be towed to the St. Lawrence River, and by this route to the lakes, her final destination being the Chicago Exhibition.

Death of Surgeon-General H. W. Bellew, C.S.I.—The death of this remarkable Oriental scholar, on July 26th last, is an event which should not pass unnoticed in these pages. Though not on the list of Fellows, the name of the deceased officer appears from time to time in our 'Proceedings,' and always in evidence of his capacity as a geographer and explorer. In addressing the Geographical Section of the British Association, on the occasion of the Society's jubilee, held at York in 1881, Sir Richard Temple referred to the information afforded by Bellew in the South and West Districts of Afghanistan; while his valuable paper on "Kafiristan and the Kafirs," contributed to the 'Journal' of the Indian United Service Institution, supplied material for a highly interesting, if but a brief, note in the April number of the previous year's 'Proceedings.' His separately-published works are almost invariably contributions to geography and kindred science. Appointed to the Indian Medical Establishment in recognition of the services of his father, Brevet-Major H. W. Bellew killed during the retreat from Kabul in January, 1842—Assistant-Surgeon Bellew reached Calcutta in March, 1856. An experience of some months of the Scutari hospitals, and with sick and wounded troops on board a transport during the Crimean War, stood him in good stead, and, combined with natural ability, paved the way for rapid professional advancement: so that in the year of his first arrival in India he was placed in medical charge of the Corps of Guides on the Peshawar frontier. In the following year he was selected for similar duty with Major (now Sir Harry) Lumsden's Mission to Kandahar. If the important character of that Mission rendered the choice of officers to compose it a delicate and difficult task, Dr. Bellew's appointment as one of its few members, when he had not completed a full year of Indian service, was indeed an honourable distinction. When the Mission returned to India in May, 1858, at the expiration of the most critical period of the Mutiny, the Governor-General's acknowledgments to Major Lumsden for "the great and lasting good services" done, were tendered "in the warmest terms;" and thanks were also expressed to Lieut. P. Lumsden and Dr. Bellew for "very efficient aid," and "for their most useful contributions to our knowledge of Afghanistan." Thenceforward, Bellew, independently of medical duties, was in constant requisition for special and responsible posts—responsible not so much in direct relation to Government, as in the guidance of its most trusted officers. Space, however, will only admit of a passing reference to these. In 1863, when in medical charge of the Guides, he was instructed to collect information on the tribes of the N. W. frontier, and otherwise render assistance in the prosecution of the Amboylia campaign; which done, he forwarded a report on the Yuzafzai country (published by the Panjáb Government). In 1869 he was appointed interpreter in the suite of the Amir Sher Ali Khan, when His Highness attended the Umballa Durbar. In 1871 he was associated with

Colonel (now Gen. Sir Richard) Pollock in his Mission to join the officer appointed to arbitrate on the Perso-Afghan question of Sistan. In 1873 he proceeded with Sir Douglas Forsyth's Mission to Yarkand; and in 1876-77, when Officiating Sanitary Commissioner in the Panjāb, he was employed in duties connected with the conferences at Peshāwar. Among Orientalists he will be much missed, for he had great capacity for acquiring Oriental languages. He had passed the higher standard examination in Hindustani, and had few equals in Persian and Pushtu (Pukhto). But it was not only as a linguist and Eastern scholar that he had earned his reputation. In his own particular profession his labours and reports have been cordially recognised. He was, moreover, a traveller and geographer, a botanist and geologist; and his services in the political department, if inadequately rewarded, have received most favourable written testimony from men high in position. His best-known works are the two large octavos entitled 'From the Indus to the Tigris,' and 'Kashmir and Kashghar' (Trubner, 1874-75). But his official and semi-official publications are of equal value, though less suited to the taste of the general public; and both his 'Dictionary' and 'Grammar of the Pukhto, or Pukhto, Language,' deserve special notice. Original in his views, Bellow would from time to time differ from his associates on questions of philology or Afghan politics; but he was neither obstinate nor arrogant in maintaining his opinions. Indeed, notwithstanding the possession of a keen insight into human kind, modesty and kindness of heart were with him the characteristics of—to borrow the words of one who knew him from early life—"a very simple nature, as free from worldliness as he was of knowledge of the world."—[F. J. G.]

The Relation of Topography to Geography.—M. L. Drapeyron presented a short paper to the French Geographical Congress at Lille, in which he recapitulates his frequently-expressed views on the importance of topography. He points out that topography, the study of the actual text of geography—that is, of the surface features of the earth's crust—is the true basis of all geography, and the platform on which that science meets the sister sciences of geology and meteorology. He strongly urges increased attention in schools, and in higher training, to the use of maps, and the recognition on the land-surface of the features represented. He would make it compulsory for every school to have prominently displayed a map of France and the special maps of the district on a large scale, the use of the latter to be enforced by frequent excursions.

Explorations in Spitzbergen.—At the instigation of M. Milne-Edwards, the French Ministry of Public Instruction in June last commissioned a young explorer, M. Charles Ribot, to proceed to Jan Mayen and Spitzbergen, and report upon the islands. M. Ribot had already some experience in northern travel, having visited Greenland, Lapland,

and Siberia. The cruiser *La Manche*, on the Iceland station, was placed at his disposal, the officers co-operating in the work of exploration. M. Ribot left Leith on July 20th, and on the 27th landed on Jan Mayen, where the entire day was spent. The buildings occupied by the Austrian circum-polar observers in 1882 and 1883 were found in good repair, and the provisions left in them were still eatable. A few small alpine flowers of brilliant colour were found in the ravines which intersect the land. Large quantities of driftwood from the coast of Norway had stranded along the shores. On August 1st Spitzbergen was reached, and observations commenced on the movement of the glaciers entering Research Bay. A very fine collection of fossil flora was made in Research Bay for the Paris Natural History Museum. The air-temperature varied from 45° F. as a maximum to 32° F., but was usually about 37°.

Mr. Conway's Himalayan Expedition.—The following telegram from the *Times* correspondent at Calcutta gives the last news of the progress of Mr. Conway's party: "Mr. Conway's mountaineering party left Askoley on July 31st, reached the foot of the Baltoro Glacier after four days' march, and proceeded up the glacier for four days. They then climbed a peak north of it, 20,000 feet high, which they named Crystal Peak, and hoped to get a view of the great peak 'K¹,' but it was hidden by a neighbouring peak. They then went another day's march up the glacier, and climbed a pass to the east of Crystal Peak 18,000 feet high. From this they saw 'K²' (or Mount Godwin-Austen), but discovered that the existing map was not correct in the representation of the neighbourhood of that peak. They also found the Baltoro Glacier considerably longer than the map makes it. A high peak not marked on the map stands at the very head of the glacier. This Mr. Conway named the Golden Throne. They determined to try the ascent, and went one march further up the glacier, and then were stopped by a snowstorm, during which they sent the coolies down to collect firewood. They reached the foot of the Golden Throne on August 18th, and then worked up behind the peak, climbing over 2000 feet through a very broken ice-fall. It took four days to establish and victual a camp above the ice-fall, at a height of 18,000 feet. They moved next day to a camp 19,000 feet, and the day following to one about 20,000 feet high. Thence, on the 25th, they started for a real climb, and having reached a point over 23,000 feet high, they found they were on a mountain entirely cut off from the Golden Throne, which was still 2000 feet above them. The peak they ascended—which they named the Pioneer Peak—commanded a magnificent view, especially in the Hunza direction, where they could see to the distance of at least 200 miles. They suffered from the great altitude, but not severely, and they could have climbed at least a thousand feet higher, and perhaps more. They slept that night in their camp 20,000 feet above sea-level. They were obliged to descend next day as their provisions were exhausted. Bad weather commenced

on the 27th, and continued, putting an end to climbing for the present season. Mr. Conway has gone to Leh for the purpose of comparing his barometer with the standard there, and accurately reckoning the height of the Pioneer Peak. He expects that the comparison will show that he attained a height of at least 23,300 feet."

The Indus Route to Gilgit.—The expedition to the Black Mountain, recently ordered, may result in the opening up of an easier route from the Punjab to Gilgit. Though the present road thither from Rawal Pindi is being improved by a contractor, who is bound to complete it on the alignment settled by our engineers, it is always liable to be rendered impassable by winter snow-falls. As an alternative route, a road along the Indus would be valuable, and the obstacles are more political than topographical. The country is inhabited by a number of petty but independent tribes, who occupy the valleys of the tributaries of the Indus. This portion of the river from Amb to Bunji was carefully mapped out by the "Mullah," one of the native explorers attached to the Indian Survey in 1876, whose work fitted in accurately between the peaks trigonometrically fixed by Captain Carter in 1864. Some useful additional topography to the south was contributed by the surveyors attached to the Black Mountain Expedition in 1889, so that the leading geographical features of the region are already fairly well known. To settle the exact line for a new road, to arrange matters with the numerous tribes, and to complete the survey up to the western watershed, must be a work of some time. Important contributions towards the geography of Yaghistan, as the independent belt of country on the Indian North-west Frontier is generally called, would doubtless be obtained in the course of its progress.

Progress made by the various Survey Parties of the Survey of India.—From recent official information we learn that in Bengal, during the last field season, the Behar Detachment completed the traverse survey of 1610 square miles in districts Muzaffarpur and Champaran. In Bombay, No. 10 Party completed 2536 square miles of detail survey, on the scale of 2 inches = 1 mile, and 2100 square miles of triangulation in the Gujarat and Mahratta country. In Burma, No. 3 Party completed the cadastral survey of 1842 square miles, and the traverse survey of 1142 square miles in district Sagaing; and also the traverse survey of 700 square miles in district Shwabo, besides a topographical survey of 106 square miles of the Chindwin coalfields, on the scale of 1 mile = 1 inch. No. 7 Party completed 881 square miles of cadastral survey, besides a traverse survey of 510 square miles in districts Amherst, Tavoy, and Mergin.

Chefoo as a Harbour.—In the Consular report on the trade of Chefoo for 1891 there are some details concerning the advantages and disadvantages of the port. It is the only treaty port in Shantung, a

province the wealth of which lies chiefly in the south and west. The eastern part of the district is windswept and treeless, and is known by the natives as "The Cow's Horn." On the north coast there is no other port at all suitable as a safe and convenient harbour; but on the south there is in every way a better port at Chiao Chou. But there is this advantage, that while during the winter the great harbours of Tientsin and Newchwang are frozen up, Chefoo remains open, and might thus become the port of supply for the whole of North China. This, however, is not the case, because when the large ports are closed very few vessels come to Chefoo. A breakwater is urgently required, as the harbour is much exposed to northerly gales, and the necessary work could be constructed at comparatively small cost. There is still some talk about gold, lead, and coal mines in Shantung, but, as Von Richtshofen points out, while coal and iron are there in some quantity, deposits of the more precious metals have never been proved to exist.

The Colony of Eritrea.—At the meeting of the Berlin Geographical Society of July 2nd, Professor Schweinfurth, who had just returned from his second journey to the Italian possessions in North Abyssinia, made some observations upon the colony of Eritrea. The traveller this year stayed principally in the southern part of the Italian territory, viz. in the province of Okula Kuni, which it was impossible to visit in the year 1891, owing to the raids of the Mohammedan Asaorta. As a rule the armed European, travelling with a small following, has nothing to fear in any part of the Italian territory. This is especially the case as regards the country of the Habab, in the north, up to the Anglo-Italian frontier-line under 18° N. lat. (Has Kasar), and that of the Maria, and in the north-west as regards the country of the Beni Amer, along half the route to Kassala. The Italian territory proper, within the line defined by the courses of the Barka and the Marsh, comprises only about 23,000 square miles, but the physical and political conditions of this region, its climate, soil, altitude, flora, and the language and religion of its inhabitants, are extremely varied. The inhabitants, with the exception of those in Massawa, and of the pure Arabs settled as shepherds in Samhar, are pure Hamites (the Saho or Asaorta races in the lowland, and on the edge of the southern highland the Beni Amer, the Bogos, or Bilin). Part of them are, by their language, more or less Semitic Hamites (Tigrines, Mensa, Habab, etc.). Only the Tigrines, Bogos, and a part of the Mensa, are Christians. All the rest are Mohammedans. The most widespread languages are the Tigro and the Tigray (Tigrinya of the Amharaes), both unwritten, and derived from the Ethiopian, or Grez, the old ecclesiastical language, which was introduced in pre-Christian times as the old Arabian dialect by the South Arabian conquerors of the country, and now bears somewhat the same relation to the Tigro and Tigray as Latin does to the Provençal dialect. While the Tigrinya speech prevails in all the northern half of Abyssinia on this side of the Takazze, the Tigre is spoken in the northern lowlands as far as the Gash, and is the language of the inhabitants of the Dahlak Archipelago, and of the strip of coast known as Samkar, north of the Gulf of Adulis; also of the Habab, the Mensa, the Maria, and of half of the Beni Amer, who dwell on the Barka, and to the north of the Habab. The rest of the Beni Amer, as well as the tribes of Algeden, Sabderat, and Hallenga, have, in consequence of their contact with the Hindendawa, more or less adopted the pure Hamitic language of the latter, viz. the Beja, or Tobedawi. Pure Hamitic idioms are found exclusively

in the dialects of the Sao (Shoho), the Asaorta, and the Bogos; the latter, related to that of the Agau (Khamir), is called Bilm. In Eritrea there are seven distinct regions, distinguished according to their altitude, climate, composition of soil, and vegetation. First of all comes the hot coast region, named "Sambar," which comprises the low hilly country up to about 1000 feet above the sea-level. Behind this, extending up to the steep slope of the highland, lies a kind of sub-alpine region, which between 1000 and 6000 feet is furrowed by deep valleys, and includes the foot-hills, which are for the most part covered with bush and forest. The highland itself, which comprises the most northern and north-easterly parts of Abyssinia, possesses at the edge of its steep escarpment almost everywhere an average altitude of 7200 feet, with summits of from 7875 to 8500 feet rising from it. Westwards the land falls away sharply from the edge of the high plateau; the numerous valleys which furrow this slope lead down either to the Mareb or to the Anseba. The spurs of the highland north of $15^{\circ} 30'$ N. lat. present irregular physical conditions, and form the territories of the Bogos and Mensa, which lie at an altitude of between 6000 feet and 5250 feet, and form the fourth division of the country. The fifth is represented by the mountainous region of the Habab and the Maria. Here the line of the escarpment resolves itself into a series of more or less parallel mountain walls diminishing in height towards the south, enclosing the River Anseba and its side valleys. The valleys in the west leading down from the mountains of Bogos and Maria to the Upper Barka form the principal territory of the Beni Amer, and constitute the sixth division of the country. The vegetation of these valleys corresponds in character with that of the Egyptian Sudan and of Southern Nubia, and may be regarded as typical of the African desert steppes. The seventh region consists of the recent coral formations of the outermost coast border and of the islands lying off it. Few countries in the world exhibit such a great variety of cultivated plants as Abyssinia. The most varied products of the soil could be grown here if the people, who are constantly disturbed by predatory and civil wars, could only enjoy a settled and peaceful existence. The Greeks understand far better than the Italians how to make profit out of Eritrea, just as they do in Egypt. Everywhere in the streets and in the country they are to be met with; the native population already identifies them with the civilian class known under the name of "*burghese*." At Keren, far in the interior, they have already built a church with a belfry. The Italians who arrived earlier in the country have preferred for the most part to settle down in Massawa as Government contractors, where they carry on their business more conveniently than formerly. Massawa is now the most important town on the Red Sea, and numbers 20,000 inhabitants, of whom 600 are Europeans, exclusive of the military. The health of the place has been excellent since the Europeans have drunk only distilled water and have kept at a distance from the huts of the natives, and the mortality among the garrison is lower than in many of the garrison towns in Italy. The railway to Snati (16 miles) spares the traveller the fatiguing march across the hot coast region, and a high road conducts him from there over the two hill ranges of Dikdikta (1475 feet) and Dankolio (3280 feet) to Ginda, situated among the hills 18 miles distant, where mules, horses, camels, and porters are to be had in abundance and at cheap rates for all further travelling in the interior. With such facilities for travel one is surprised that the magnificent mountain region is not visited more often by travellers and sportsmen.

M. Méry's Journey in the Sahara.—At the meeting of the Geographical Society of Paris, on June 17th last, M. G. Méry gave an account of his recent journey in the Sahara, in pursuance of a geographical

and commercial mission to the south of Wargla. Accompanied by three natives only, M. Méry quitted El Wed on February 15th, and in three days reached the left bank of the Igharghar, near Hassi Uled Milud. The traveller then entered the region of the "gur"; between these "gur" lies a series of depressions, like the beds of dried-up rivers, possessing a breadth of from $1\frac{1}{2}$ to 2 miles, and communicating one with another. Beyond the wells of Uled Salah the chalk crust of the summit of the preceding "gur" appears at the surface of the soil, either in regular banks or in *débris*. Crossing the ridges of Zanun, the traveller found between the "ghurd" of Kolel and that of Turba a depression, the banks of which are composed of nearly gypsum; in the white salt covering the bottom of this depression he discovered some well-preserved shells of "*cardium edule*." This is by far the most southerly point of the Sahara where this shell has been found. Beyond Ain Taiba the region of the "gassi" was entered. The "Grand Gassi" attains a breadth of $7\frac{1}{2}$ miles, and is flanked on the east and west by majestic chains of dunes. Passing through El Biod, M. Méry traversed the Sebka Tarfa, which is covered with immense clumps of tamarisks, and, crossing again in $27^{\circ} 41'$ N. lat. the bed of the Igharghar, arrived at a spot a little to the south of Tin-Sig, M. Fourné's extreme point. From here he hoped to reach Tebalbalet, where he would have been only 5 or 6 days' march from the first encampments of the Tuareg Azjer; but his guide refused to go further south. The return journey was accomplished along the old route up to Taiba, but from this point by a more easterly course through the gassi of Mokhanza. He arrived at El Wed on April 1st, having travelled 947 miles. The whole route was carefully surveyed, and is stated to offer great facilities for the construction of a railway for the purpose of tapping the Central Sudan.

The Railway from Antofagasta to Uyuni and Oruro.—In a paper read to Section E. of the British Association, Mrs. Lilly Grove, of Oxford, described this remarkable railway, and her experiences during a journey on it. The railway from Antofagasta to Uyuni and Oruro is one of the most interesting examples of a high altitude railway, as well as one of the most brilliant triumphs of engineering. It is 382 miles long, and scales a plateau of 13,100 feet through the aridity of a desert. This railway provides rapid and economical means of communication between the Pacific and the southern part of the Bolivian table-land, accessible until lately only to men hardened to endure the rigours and dangers of the desert. Antofagasta, the terminus of the railway, is one of the worst harbours on the West Coast of South America. The town has a population of 10,000. Rain never falls, and there is no fresh water, the inhabitants being dependent on the condensation of sea-water. But recently works have been made which bring water into the town from St. Pedro, 11,560 feet above the sea-level. In a journey on the mountain railway Antofagasta is left about 7 A.M., breakfast is at 10 A.M. at Salar del Carmen, where much business is done in nitrate. At Salar the ascent begins to be very steep. The heat is terrible: the sun's rays fall straight on the railway carriage and on the white soil of the desert. The train mounts slowly on an even incline stretching far out to the horizon. About 5 P.M.

Sierra Gorda, the station for the mines of Caracoles, is reached. About 5.30 the train begins its ascent once more, but as night approaches there is a sudden change of temperature. On account of the rapid radiation the cold pierces to the very bones. The road keeps winding round the Limon Verde, with its steep volcanic rocks. From time to time is seen on the right the wonderful panorama of the deep and immense lake of Atacama, which is buried in the midst of the desert, and surrounded by a chaos of many-coloured mountains. Above this marvellous scene tower the heights of the volcanoes Licancour, San Pedro, and San Pablo, and others; then the road descends into the valley of the Loa, which forms the northern limit of Atacama. About 8 p.m. the train stops at Calama, called the "Queen of the Desert," a little Indian village built of rock-work and mud-mortar, on the shores of the Loa, which has brackish but more or less drinkable water. This river irrigates a few fields of Indian corn and clover—a true boon in these regions, and a refreshing rest to the eyes of the traveller in the desert. Next morning early the train starts for the second section of 270 miles, from Calama to Ollague. At that time the temperature is freezing; but soon the heat again becomes unbearable. The line passes close to the volcanoes San Pedro and San Pablo, 19,500 feet high, which are still active, and at the foot of which are the freshwater springs which the English waterworks company carry on to Antofagasta. At the height of 13,287 feet is the volcano Askotan, at the edge of the borax lake of same name. The next stopping-place is Cebollar, where are the purest freshwater springs, and about 10 p.m. Ollague is reached. Ollague is 12,126 feet high, and the frontier station between Chili and Bolivia. Water is brought from the oasis Amincha, which, according to the Bolivians, is capable of maintaining their 11,000,000 llamas. The carts from Huanchaca silver mines discharge their loads here. At Ollague the train takes in a heavy supply of water for the next day's journey to Uyuni, a centre of great activity. Near to Uyuni are the celebrated mines of Huanchaca. The Bolivian Government has decided to build a town at the spot, and it will become the most important centre for silver-mining in South America.

The Marshall Islands.—A recent number of the 'Deutsches Kolonialblatt' contains the official report for 1891 on the German protectorate of the Marshall Islands. Statistics as to climate and health will be given in a special report; that now published deals with population, productions, laws, and commerce. The aboriginal population of the group is estimated as 15,000. In consequence of their habit of wandering from island to island the natives are not easily counted. In Namor, which is more isolated than the other members of the group, a census was taken, and the population found to be 1318—444 men, 580 women, 141 boys, and 153 girls. There were 94 whites in the group, of whom 30 were German, 18 American, and 17 British. Apart from German officials, the European residents were chiefly agents of commercial houses, independent traders, and planters. The barren coral soil covered with a very thin layer of mould allows only the coconut palm, pandanus, bread-fruit, and arrowroot to flourish, the last-named being cultivated to a small extent by the natives. The production of copra is the main industry producing results of value for export, and 3,700,000 lbs. of this commodity were produced in 1891, principally in the islands Ebon, Arno, Majuro, and Jaluit. Live stock cannot be profitably kept unless the native grass is displaced by a more nutritious variety. Fishing is unimportant, and the deposits of guano which occur are not rich enough to be of much value as manure. Most of the imports come from the United States, then from Britain and Australia, Germany coming third, although first in importance for receiving the exports. Postal communication is kept up with Sydney, San

Francisco and other centres, by such trading vessels or warships as may happen to visit the groups. Revenue is raised by a tax on copra-production, varying from 9 to 18 per cent. of the total yield. Native missionaries under the Boston Missionary Society are stationed in several of the islands, which are also visited regularly by the white missionaries of that Society. Altogether the result of the German protectorate has been to show that the islands have not a very brilliant future before them, although they are likely to prove an increasingly valuable market for German goods.

The Island of Espiritu Santo, New Hebrides.—Capt. J. Williams has recently contributed to the Queensland branch of the Royal Geographical Society of Australasia a few notes descriptive of the little known island of Espiritu Santo and its inhabitants. The island of Santo, named by the old Spanish navigator, Quiros, "Espiritu Santo," is the largest of the New Hebrides group, being about 80 miles in length, and is, both in appearance and in historical association, the most conspicuous. It is said to rise very abruptly from the ocean on its western side, presenting the appearance of a long, bold mountain range, whose culminating peaks in places attain altitudes of over 5000 feet above sea-level. From these, it is said, numerous spurs radiate to the sea-shore, divided by deep gorges and narrow valleys, through which the tropical rainfalls are carried to the ocean. The island of Santo offers many attractions to the ethnologist; man, we are told may here be found in the most primitive condition. The people have many strange customs unknown in other islands of the group, notably that of the sacrifice of the wife on the decease of the husband. On the east coast, in St. Philip's Bay, and among the neighbouring small islands, the natives are described as being of magnificent physique, frequently standing six feet high, and well-built, black as jet, with no sickness to be seen amongst them. The inhabitants of the west coast are usually poorer specimens of humanity; their skin of a lighter colour, and their appearance not so savage-looking. The customs of the natives in some things resemble those of the Torres Islanders. The people are stated to be confirmed cannibals. The population of the west coast of the island, which, several years ago, was very numerous, is apparently decreasing rapidly, probably owing to the practice of poisoning.

Progress of British North Borneo.—A recent Consular report contains some interesting information about the produce and population of Borneo. Wrap tobacco alone is cultivated with care; but in the majority of cases the crops were unsatisfactory—a result due to the sensitiveness of the plant, which can only flourish where sun and rain alternate, and where there is no set dry season. For any other tropical cultivation the climate is as near perfection as possible, and a coffee company has now commenced work at Malluda Bay. The cultivation of manilla hemp is being considerably extended. Previously it had been grown only in the Philippine Islands, where it has been a source

of great wealth to all concerned. Gambier is also being tried; the Chinese in charge say that the crop will be ready two or three months earlier than in Singapore. The people of the west coast rivers are known as "Dusuns," and give little trouble except when an occasional mania for head-hunting seizes them. In the interior, which is fairly well peopled, tobacco is the current medium of exchange. The natives here are intelligent and industrious; but it is otherwise on the Kina Batangan, where conversion to Mohomedanism has fostered very lazy habits. It is fourteen years since the first Government station was established in the forest-covered east coast districts. It was expected that there would be a large influx of Chinese, and this at first was the case; but it was soon proved that Chinamen were not good settlers in a new country where hard work had to be done. Only in the settlements of the Christian Hakkas is there real progress. They only cultivate vegetables and fruit for local sale, and until some produce capable of large exportation is discovered, there cannot be great progress in any part of the country. The Lulus are the only other people who have showed any disposition to make permanent settlements. The total population is estimated at 120,000; that of Sandakan about 6300. One or two expeditions were made up the Segama River, but the gold obtained was insignificant; better reports come from a place between Lahat Dato and the Segama. Captain Stewart gives a short list of the game which the sportsmen may easily find, including elephants, bisons, rhinoceros, bears, any amount of deer, and pigs. It is nearly all forest hunting.

Progress of the Danish Expedition to Greenland.*—News, we are informed, has just reached Copenhagen of Lieut. Ryder's exploring expedition to the east coast of Greenland. The expedition, consisting of nine members of the Danish Royal Navy, under Lieut. Ryder, left Denmark on June 8th of last year, on board the Norwegian sealer *Hekla*. On August 20th following, Lieut. Ryder's party arrived at Dyre Fjord, on the north-west coast of Iceland, and thence proceeded to Scoresby's Land, where they passed the winter at a place 70° 27' N. latitude, spending the time in collecting specimens and making observations. On the 8th of last month Lieut. Ryder left his winter quarters and returned to Iceland, but intends on the 26th inst. again to proceed to the Greenland coast, where he hopes to be able to land at about 68° N. latitude, on the unknown coast between Scoresby's Sound and Southern Greenland. Great scientific results are stated to have been already achieved by the expedition.

* *Vide 'Proceedings,' 1891, p. 297.*

PROCEEDINGS OF THE GEOGRAPHICAL SECTION OF THE BRITISH ASSOCIATION.

EDINBURGH MEETING, 1892.

(Continued from page 657.)

Thursday, August 4th.

AFTER the President's Address, the following papers were read:—

The First Ascent of the Öræfa Jökull, Iceland. By F. W. W. HOWELL.
—This paper will be published in a subsequent number of the 'Proceedings.'

Place-Names. By Dr. J. BURGESS.—Dr. Burgess, like most Oriental scholars, took exception to the phonetic principle in rendering the place-names of countries which have a native literature. It was more scholarly and more satisfactory, he maintained, to adopt a definite transliteration of each foreign alphabet, based, of course, on the best authorised form of the name in each instance. Dealing more particularly with the question of Scottish place-names, he referred at some length to the errors in Gaelic spelling found on some sheets of the Ordnance Survey maps. The unsatisfactory rendering of these names induced Sir Charles Wilson some time ago to suggest the revision of the nomenclature of the Highland sheets by a Committee of the Royal Scottish Geographical Society, and of this Committee Dr. Burgess has acted as convener. The paper gave rise to considerable discussion, remarks being made by Sir CHARLES WILSON, Mr. MACKINDER, and others. In connection with the subject of Gaelic place-names, a Committee of the Association was subsequently appointed, with a small grant, to co-operate with the Committee of the Scottish Society.

On the Winding of Rivers. By J. Y. BUCHANAN, F.R.S.—This paper summarised the hydrokinetical principles which regulated the form and size of the arcs traced out by rivers in their windings, forms which were largely independent of the character of the ground.

On the Effects of Rainfall in the Island of Formosa. By JOHN THOMSON.—An interesting feature of this paper was the remarkably fine set of photographs of natural features with which it was illustrated. The island affords a striking example of the work of man within a contracted area in altering the surface of the land, building up plains seawards, and ultimately fitting them for tillage and the support of an increasing population. It is necessary to note the geographical position and configuration of the island, ocean currents, temperature, and prevailing winds, in order to make the subject intelligible. Formosa lies between 21° and 25° north latitude, while the 121st° of east longitude divides it into nearly equal parts from north to south. It is over 200 miles long, and its width varies from 50 to 80 miles. It is traversed by a spine of lofty mountains throughout its whole length from north to south, having a maximum altitude of 12,000 feet. It will be seen that after the rains the drainage of this chain is necessarily carried over a very small area, and that the changes caused by erosion and the deposit of detritus must be well defined. The Pacific Gulf Stream, known to the Japanese as "Kuro-siwo," flows north on the eastern side, raising the mean temperature of Formosa to about ten degrees higher than that of the mainland. The prevailing winds throughout the year are the north-west and south-east monsoons. The former begins to blow about the end of October and continues on to

April. In its passage across the ocean from the north it is charged with moisture taken up from the warm Gulf Stream, and coming in contact with the lofty mountain barrier of Formosa, it is forced up to a great altitude, where its burden of vapour is liberated by the lighter and colder air. This is discharged over the forest-clad heights in copious rain. On the eastern side the rain descends through chasms and gorges in torrential streams, and cataracts carry it back to the ocean. The eastern side presents a rocky front to the sea. The denudation of the mountains by erosion and its effects can hardly be traced on this side of the island, as the detritus is deposited in the deep sea adjoining the cliffs. On the west of the central chain, where the gradient is more gentle, we find an extensive plain, part of which has been built up within the historic era by the detritus washed down from the mountains, and the major part in a similar manner during the carboniferous period; as may be gathered from extensive coral islands (and other geological formations) which now form part of the low-lying land redeemed from the bed of the ocean. But we need go no further back for evidence of the rapid upbuilding of the western plain than the date of the Dutch occupation in 1634. Two forts were erected—one, *Providentia*, at the mouth of the Formosa River (*Taiwanfu*), the other on the island of Taiwan. The former may now be traced within the walls of *Taiwanfu*, more than five miles inland over the plain, while Taiwan with its fort has been long united to the mainland. Evidence of how this change has been accomplished exists in the table-lands and spurs of the central range, about 15 miles inland from *Taiwanfu*, in the manner in which these lower "no man's lands," so named by the Chinese, are cut up and demolished by the drainage of the lofty chain, chasms cut out by torrents during the rainy season, vast funnel-shaped pits where the land has fallen in, undermined by water, broad river-beds cut deep into the table-lands, their banks strewn with rounded and polished boulders of gigantic proportions, that have been driven from inaccessible heights and rounded on their downward course to the plain. The greater part of the plain is an "alluvium," a rich loam derived partly from the shales of the central mountains, partly from the sandstones, and partly from the limestone hills which reach here and there above the level of the lowland. These are the great and small Kangshan, the Whaleback, Apeshill, Saracenshead, Fungshan; also still more elevated hills inland approaching Buksa Valley; and at sea, Lambay Island, off Tangkang. We see thus within the narrow compass of the island of Formosa rainfall and its results, year by year adding to the habitable plain, and creating extensive shoals between the island and mainland. Another phase of rain-work in Formosa is the effect which the central mountain range has in withdrawing the moisture from the atmosphere as it sweeps over the island during the south-east monsoon.

A Journey in Lesser Tibet. By Mrs. BISHOP.—Mrs. Bishop's journey took place in 1889, when she penetrated the border-land of Tibet from Kashmir. Most attention was directed to the characteristics of the various tribes encountered.

Friday, August 5th.

The first four papers have been published in full abstract in last month's 'Proceedings,' pp. 619-628.

A New Chart of the Currents of the North Atlantic. By THE PRINCE OF MONACO.

Meteorological Observatories in the Atlantic Ocean. By THE PRINCE OF MONACO.

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The Density, Temperature, and Motion of the Waters in the Gulf of Guinea. By J. Y. BUCHANAN, F.R.S.

The Physical Geography of the Firth of Forth. By Dr. H. R. MILL.

On the Need for Teaching in Meteorology. By H. N. DICKSON.—The selection of subjects for elementary scientific instruction raises several questions concerning the relations of the different branches of physical science to each other. Apart from special applications to arts and manufactures, a want is felt of a subject which shall at the same time afford opportunities of illustrating scientific methods, and give examples of practical value in accounting for many natural phenomena of common observation. The ordinary phenomena of meteorology, as embodied in the weather folk-lore current everywhere, are already familiar to sailors, fishermen, and farmers, the classes it is most important to reach, and by properly classifying and arranging the facts already known to them several laws may be made to suggest themselves. In this way the meteorological elements which in this restricted sense underlie a great part of biology, geology, and geography, form an introduction to the fundamental notions of these sciences, as well as to those of physics involved in their discussion. There is as yet no instruction in meteorology available anywhere in this country, but in view of the rapid development of technical education it is urgent that this should be remedied. The best method of properly introducing the subject seems to be that the facts of the case should be set before the Technical Education Committees of the County Councils, backed by the approval of the various bodies whose function it is to regulate and extend scientific instruction. In this way a demand for teaching in meteorology would be created, and the supply should come from some of the main fixed centres of technical education, which should not only supply systematic instruction, but should be in a position to deal with questions referring to the relations of meteorology to agriculture, fisheries, &c., and to discuss the data collected by the teachers sent out bearing on local observations and prognostics.

The Railway from Antofagasta to Uyuni and Oruro. By Mrs. GROVE.—See Geographical Notes in this number, p. 707.

Photography as a Means of Surveying. By Colonel TANNER.—This paper illustrated the value of the camera in making angular measurements between prominent features.

Celestial Photography as a Handmaid to Geography. By Dr. H. SCHLICHTER.—In many respects this was the most important paper read before the Section, setting forth, as it did, an entirely new method of geographical observation, which seems capable of solving effectually the problem of finding the longitude in land travelling. It will probably come before the Society in an elaborated form next session. Lunar distances as a means for the strictly accurate determination of geographical longitudes have been little used of late, partly on account of the splendid chronometers with which ships are now provided, and partly owing to the inaccuracies of the instruments commonly employed for lunars. For exploring expeditions on land, however, chronometers are of little value, and the other astronomical phenomena which may be used besides lunar distances are either too difficult of accurate observation by the majority of travellers, or occur too seldom, or are not accurate enough. The author therefore introduces a new method of observation and measurement of lunar distances, viz., by obtaining a parallel series of photographs of the moon and a fixed star or planet on one plate, and afterwards measuring the distances on the plate. For the elimination of all possible inaccuracies of the photographic film or of the lens, the lunar distances thus registered are checked

by repeatedly photographing on the same plate two fixed stars, the positions of which are given in the 'Nautical Almanac,' and the angular distance of which can easily be computed therefrom. The angular distances of the photographic lunars are then found by a simple proportion. The time for taking a set of eight photographic lunars on one plate does not exceed three to four minutes, and micrometric measurements show with perfect accuracy the change of the lunar distances (owing to the movement of the moon) during each interval of the eight observations. The minute accuracy of the method is hereby established. The micrometric measurements on the plate are made by means of the same 'râseau' which is employed by the principal observatories for stellar photography, and the measurements may therefore be regarded as absolutely correct. Results thus obtained give the correct longitude of the place of observation. The author proposes to use this method for scientific expeditions into the interior of continents, &c., as well as for the further determination and correction of secondary meridians in navigation. For both purposes it is especially adapted on account of its minute accuracy and great simplicity.

Monday, August 8th.

Two Journeys in the Kalahari Desert. By EDWARD WILKINSON.—Will be published in full in the 'Proceedings.'

Explorations Amongst the Ruins of Zimbabwe. By J. THEODORE BENT.

Report of the Committee for Investigating the Ruins of Mashonaland.

The Orientation of the Ruins of Zimbabwe. By ROBERT SWAN.—The subject of these papers was fully dealt with in our 'Proceedings' for March last.

The Industrial Geography of Nyassaland. By JOHN BUCHANAN.—The remarkable coincidence of fertile soil, and intelligent natives who are willing to work, was pointed out by the author as auguring well for the industrial future of the country, as soon as the development of coffee-planting and the freeing of transport on the Zambesi supply a staple export and a means of ready communication with the rest of the world.

Across the Veldt to Lobengula's Capital. By Lieutenant H. CRICHTON BROWNE.

On Opening Relations with the Hausa Race of West Soudan. By DR. A. H. HALLEN.—In the Western Soudan there are many tribes, but two chief—Hausa and Fellani. The Fellani or Fulbe are warlike, fanatical, pastoral. The Hausa are brave, but not so fond of war; not fanatical, but commercial. Where the two come in contact Hausa language predominates. The author gave a sketch outline of Hausaland, its population, physical geography, meteorology and climate, political economy, nature of people and social economy, slavery, education, towns, religion, and then spoke of the work to be done, and of the necessity of learning the Hausa language. He referred to (1) the commercial importance; (2) previous work and its shortcomings in this direction; (3) comparative philology; (4) dialects; (5) writing in Arabic characters. He then went on to refer to ethnology, customs, history, folk-lore, music, climatology, geology, &c. Mr. Hallen finally described his proposed method of work under the heads:—(a) Preliminary knowledge of Arabic; (b) preliminary residence in Tripoli; (c) residence in Hausa where? and methods of drawing the people: (1) personal influence and discussion; (2) medical; (3) non-interference in local politics; (4) educational. (i.) Juvenile; (ii.) adult: diffusion of useful books, especially simple illustrated agricultural books, in their own language.

Report of a Committee appointed to Inquire into the Climate of Tropical Africa, the Committee consisting of Mr. E. G. RAVENSTEIN, Mr. BALDWIN LATHAM, C.E., and Mr. G. J. SYMONS, F.R.S. (Secretary).

1. The work of your Committee naturally falls into two branches, viz., firstly, the collecting and epitomising of all available series of meteorological observations; and, secondly, the exercise of a friendly influence over existing, and the equipment of new, stations, likely to promote a better knowledge of the climatological conditions of Tropical Africa.

2. As regards the first of these objects, your Committee have prepared abstracts of the records of sixty-seven stations (including forty-two at which the observations extended over one year). As the places for which there exist records for at least one year number close upon eighty, your Committee deemed it advisable to postpone the publication of these abstracts until it shall be possible to present them in a collected form.

Unpublished series of observations have been received by your Committee from Captain Chippendale (Upper Nile, 1874-5), Rev. C. Paul (Kipo Hill, 1881), Rev. Mr. Wakefield (Ribe, 1886-7), Rev. G. Smith (Asuan and Wadi Halfa, 1884-5), Mr. R. S. Hynde (Domas, 1888-9), and Captain Galloway (Benin, 1891).

Your Committee are likewise indebted for useful information and printed meteorological records to Captain Capello, Prof. Neumayer, Dr. Turchini, Prof. Angot, Dr. Etienne, and M. A. Lancaster.

3. As the funds placed at the disposal of your Committee are not sufficient for the establishment of independent stations, with paid observers, they are constrained to confine themselves to the distribution of "Instructions" specially adapted for Tropical Africa, and calculated to ensure the trustworthiness and uniformity of the Records, and of blank forms intended to ensure uniformity in the record of observations, and, in a few cases, to the supply of instruments to approved volunteer observers.

The "Instructions" direct observations to be taken either thrice daily (at 9 A.M., 2 P.M., and 7 P.M.), or once daily (at 9 A.M.), as also at two-hourly intervals on certain term-days.

The "Instructions" which are being distributed among all observers stationed in Africa are to be supplemented, where necessary, by a copy of the 'Hints for Observers,' issued by the Royal Meteorological Society.

4. The instruments supplied include, as a rule, four thermometers (max., min., wet, and dry bulb), and a five-inch rain gauge. The thermometers are placed within a galvanised iron cage, which they have specially devised for use in Africa. Additional instruments are to be supplied as may be required and funds permit, as also a standard barometer, where a guarantee can be given for its safe conveyance.

5. Up till now sets of instruments have only been granted to Mr. J. W. Moir (Nyasas) and Captain Galloway (Benin), but further applications are under consideration.

6. Your Committee have expended £50 out of the £75 granted, and they beg to propose that they be reappointed, with the addition of Dr. H. R. Mill, and £25 lapsed grant of 1891, and a fresh grant of £25, or £50 in all.

Tuesday, August 9th.

On a New Project for Drying-up the Zuyder Zee. By Professor P. H. SCHOUTZ. —The substance of this paper will be published in the 'Proceedings,' R.G.S.

A Proposed International Map of the World. By E. G. RAVENSTEIN. —At the recent Geographical Congress of Bern, Dr. Penck proposed the publication

of a map of the entire world on a uniform scale of 1:1,000,000. This proposition was favourably entertained, and a committee was appointed to take steps for its realisation. That the scale chosen is the most suitable for the purpose will hardly be doubted by anyone practically acquainted with the mapping of the world. To construct such a map on a projection embracing considerable portions of the earth's surface, if not entire continents, would necessarily have led to an amount of distortion quite inadmissible in a map on such a scale. Dr. Penck, therefore, does wisely to accept the method of drawing each sheet on an independent projection, which was first adopted in India, and has subsequently been introduced into Germany, Austria, the United States, and other countries. By this method the separate sheets are nearly equivalent and orthomorphic, the error, for a five-degree sheet under low latitudes, never exceeding $4 \frac{1}{1050}$ ths. This is less than the error due to the expansion of the paper in the printing-press. Each sheet, up to 60° N., would embrace five degrees in each direction; the more northern sheets would embrace ten degrees of longitude each. The representation of the whole earth, including the sea, would require 936 of these sheets, whilst the land alone could be shown on 789 sheets. Physical and political features are to be adequately considered. Rivers are to be in blue, hills in brown. Contours are to be drawn at 100, 300, 500, and 1,200 metres, and the areas enclosed by them, which Dr. Penck assumes to be equivalent, are to be tinted. Those sheets which deal with countries already surveyed would be engraved in copper; the remaining sheets might be lithographed. The Greenwich meridian is proposed for acceptance, but all altitudes are to be in meters. The official spelling of all countries using the Latin alphabet is to be retained, even in their "spheres of influence." Other alphabets are to be transliterated in accordance with a system to be agreed upon, whilst names in unwritten languages would be spelt phonetically. Dr. Penck estimates the cost of an edition of 1000 copies of this map (land surface only) at £191,438, and as the sale of this edition at 2s. a sheet would produce only £88,000, the deficit of £103,438 would have to be made up by the governments concerned, or by liberal private patrons. There is nothing Utopian about the scheme, as far as I can see. Difficulties may arise as to the spelling of the names, or the introduction of the meter, but the essential thing, to my mind, is the production of a map—a map on a uniform scale. If it is borne in mind that twenty-five 5-degree sheets of such a map of Africa were, some years ago, published by me, with the help of the Royal Geographical Society, and that twenty-one sheets of the same map are now in course of preparation, and that all this was done by me unaided, it must be admitted that better and speedier results might be brought about by an organised co-operation.

A Recent Visit to Yemen in Arabia. By WALTER B. HARRIS.—Mr. Walter B. Harris's paper on Yemen deals with a journey undertaken by him in the early months of this year, and during the rebellion of the Arabs against the Turks. Mr. Harris started from Aden early in January without guards, and accompanied only by one of his trusted Morocco servants and a guide, all three mounted on camels. Passing through Lahej, Mr. Harris continued his journey over the desert, until, after issuing from the mountain gorges of Khoreiba, he reached Kataba, the Turkish frontier town, and by means of a disguise succeeded in obtaining a permit to pass into Turkish territory. From Kataba to Yerin the journey was a very dangerous one, and the travelling was nearly all accomplished by night, the day being spent in hiding in the jungle. From Yerin the journey was continued to Dhamar, and thus to Sanaa, the capital; Mr. Harris having taken nineteen days in accomplishing the distance, nearly 300 miles. On his arrival at Sanaa he was seized by the Turkish authorities and thrown into prison, where, owing to the unhealthy state of the place, and the bad water supplied to him, he was taken

ill with fever. On the 18th day of his imprisonment he was sent away to Houaidah, on the Red Sea coast, under an escort of Turkish soldiers, the journey occupying about five days, the distance being something under 200 miles. Mr. Harris passed through much wonderfully beautiful scenery, and has brought back an account of Arabia Felix which entirely belies one's ideas of that country. By most people Arabia is considered to be a desert, but Mr. Harris has found that Yemen at least is a country of magnificent fertility, the great plateau, lying at an elevation of from 7000 to 9000 feet above the sea-level, being in a state of excellent cultivation. Water is by no means scarce; in fact, in many places there are rivers of no inconsiderable size. Although the journey has been made once or twice before, Mr. Harris is probably the first European who has reached Sanaa from Aden. After much hard travelling, several narrow escapes, four days' imprisonment in a Turkish gaol, and a violent attack of fever, Mr. Harris reached Aden towards the end of February with a considerable number of photographs and a large collection of notes and sketches pertaining to a country of which but very little is known. At any time the journey would not be an easy one, and considering that the country was in a state of revolt, Mr. Harris had to overcome very many difficulties before reaching Sanaa.

A Recent Visit to the Chatham Islands, and some Points in Connection with Geographical Distribution. By H. O. FORBES.—Mr. Forbes was fortunate enough to discover on the Chatham Islands the remains of a flightless bird akin to those inhabiting New Zealand. While farther search in the islands of the Southern Ocean is necessary before speaking too confidently on the subject, the bearings of the find on the early existence of continuous land in the far south is of real importance.

Recent Exploration in New Guinea. By COUTTS TROTTER.—This paper will be published in an early number of the 'Proceedings.'

A Journey in Central Siam. By W. R. D. BECKETT.—This paper will be published in the 'Scottish Geographical Magazine.'

Cadamosto, and Early Exploration in Africa. By H. YULE OLDHAM.—Alonse da Ca da Mosto, born in Venice in 1432, entered, like Columbus and other Italians, the service of Portugal, and at the instigation of Prince Henry the Navigator made two voyages along the west coast of Africa in the years 1455 and 1456. In the second of these the Cape Verde Islands were discovered for the first time. The journals of these voyages form one of the earliest personal narratives of an explorer, and are of particular value as a connecting link between the periods of Prince Henry and Columbus, the two great figures in the history of geographical discovery in the fifteenth century. As the trustworthiness of Cadamosto has been seriously impugned, the object of the paper is not merely to draw attention to the merits, but to vindicate the character, of this important traveller.

North Korea. By C. W. CAMPBELL.—A full account of Mr. Campbell's journey appeared in the 'Proceedings' for March.

Three Committees, appointed under the auspices of Section E, received grants from the Association. These are the Committee on Scottish Place-Names, already referred to; the Committee on African Meteorology; and a new Committee on Exploration in the Karakoram Mountains, in connection with Mr. Conway's expedition.

PROCEEDINGS OF FOREIGN SOCIETIES.

Geographical Society of Berlin.—July 2nd, 1892: Privy Councillor BLUMER in the Chair.—Dr. Lieder read a paper upon his exploration of the coal deposits of Itule, on the Lower Lujende, the great right-bank tributary of the Rovuma. The result of the expedition is to confirm the existence of coal in that region, but the question of its profitable working still remains open. Dr. Lieder fully corroborates Thomson's description of the extraordinary impassability of the Makonde plateau, which is covered with dense brushwood.

Professor Schweinfurth then read a paper on the Colony of Eritrea (see Geographical Notes).

Geographical Society of Paris.—June 3rd, 1892: M. CHEYSSON in the Chair. An extract was read from the Russian journal 'Kavkas' (Tiflis), giving an account of a paper recently read before the Geographical Society of Tiflis by M. K. N. Rossikof, on the glaciers of the Caucasus, which he has studied for the last ten years. According to his observations, made more particularly in the region between Adai-Khok and Kazbek, the glaciers of this part of the Caucasus are sensibly diminishing.

M. Venukoff sent an extract from a Russian newspaper, detailing the experiences of two Russian cavalry officers, MM. Leontief and Patrin, on a journey across Persia and Beluchistan.

General Dorrécaigne, Vice-President of the Central Commission, gave a sketch of the work of exploration in West Africa accomplished by MM. Monteil, Mizon, and de Brazza, which has already been briefly noticed in the 'Proceedings.'

In conclusion, Père Le Roy, a missionary, read a paper upon the following three tribes inhabiting Eastern Africa: the Watwa, the Massal, and the Wa-chaga.

— June 17th, 1892: M. CHEYSSON in the Chair.

RUSSIAN GEOGRAPHICAL WORK IN ASIA.

M. Venukoff communicated the following information as to Russian geographical work in Asia. M. Boydanovitch is engaged in geological researches in the Altai Mountains, in order to discover the best deposits of pit-coal for use in connection with the Trans-Siberian Railway. M. Grun-Grimailo is shortly to lead an expedition to explore the north-east part of Mongolia; this expedition will be under the auspices of the Geographical Society of Russia. The latter society is organising M. Potanin's fourth journey to Central Asia. M. Berezofsky will accompany this expedition, the object of which is the exploration of Western China (provinces of Gan-Sow and So-Chuan) and Eastern Tibet. MM. Koborofsky and Kuzloff are to continue their work of exploration in Central Tibet. In Turkomania several engineers have been despatched to examine the naphtha springs and sulphur deposits.

NEWS OF M. L. DÈCLE.

A letter, dated May 1st, 1892, from Tati (Matabeleland), was received from M. L. Dècle; his previous letter was from Palapye, under date of January 26th. Since the latter date he had journeyed to Tati, and from there paid a visit to Buluwayo, the capital of King Lo Bengula, by whom he was well received. On the return journey to Tati he visited the sources of the River Kaina or Kamalo, and explored the country between the Lashani and the Mangwa. He hoped to visit Mashonaland before returning home.

M. Méry gave an account of his mission to the Southern Sahara; and Captain L. Dunod read a paper on his travels in the French possessions on the Congo.

— July 1st, 1892. M. CHEYSSON in the Chair.—A communication was read from M. G. Marcel, explaining M. J. Gaultier's method for applying photography to topography. M. E. Muller forwarded an extract translated from a Russian newspaper with reference to the ruins at the bottom of Lake Issik-Kul.

SURVEY OF THE RIVER JUE.

The General Secretary presented, on behalf of the author, M. Thollon, a manuscript map embodying the results of the survey of the Jue, one of the affluents of the Congo, recently made by him. M. Thollon surveyed very carefully the whole course of the river, the lower part of which only had been previously laid down by M. de Chavanne. He ascended the valley up to $3^{\circ} 30'$ S. lat., showing that the river takes its rise much further north than had been supposed. He also explored the Djucke, one of the principal head-streams of the Niger.

EXPLORATION OF THE UPPER NIGER AND OF THE TINKISSO.

Lieutenant Hourst, who has for the last four years been in command of the gunboat *Niger* on the Niger, gave an account of the hydrographical work accomplished by him in 1889 and 1890 on the Upper Niger and the Tinkisso. From Siguiri he proceeded to Kurussa, but was unable to ascend the Niger to its source, because Samory was besieging Bantun in Saukaran. He then turned his attention to the Tinkisso, and after a voyage of seventeen days arrived at Tumanes, on the borders of Futa Jallon. Being anxious to discover traces of Caillé, he pushed on to Biskrima, 22 miles from Tumanes, where a hunter showed him the position of Cambaya, the point where Caillé crossed the Tinkisso on his march eastwards. Cambaya is now only a ruin, having been destroyed by the Hubus. M. Hourst then traversed Uinda, Baleya, and Atmana, and returned to Kurussa, travelling partly over the ground covered by Caillé, whose itinerary seems, according to M. Hourst, to have been misrepresented on most of the maps. One of the results of this journey is to establish the navigability of the Niger from Bamako to Kurussa, and of its tributary, the Tinkisso, during five months of the year.

M. GAILLARD'S JOURNEYS IN THE CONGO REGION.

M. Gaillard read a paper on his work in the Congo region. At the instance of M. de Brazza he explored the upper course of the Saugha, along a line parallel to that taken by M. Fourneau, and subsequently undertook a more important mission to the Upper Mobangi, following the latter up to its intersection with the $2\frac{1}{2}^{\circ}$ E. long.

— July 10th, 1892: Dr. F. T. HAMT, of the Institute, in the Chair.—This was a special meeting, held in the large hall of the Sorbonne, for the purpose of giving a reception to Lieutenant Mixon, who read a paper upon his journeys between the Niger and the Congo.

NEW GEOGRAPHICAL PUBLICATIONS.

(By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.)

EUROPE.

Brown, P. Hume.—Tours in Scotland in 1677 and 1681, by Thomas Kirk and Ralph Thoresby. Edinburgh, David Douglas, 1892: 8vo, pp. 60. [Presented by the Publisher.]

Mr. Brown has edited these racy and naïve narratives as a supplement to a former volume, "Early Travellers in Scotland." Kirk travelled in 1677, and visited Edinburgh, Aberdeen, and Inverness, whence he sailed for the Orkneys, returning by Wick, and concluding his tour at Glasgow. Thoresby in 1681 did not go farther north than Stirling. The narratives are the more interesting because of the contrasted natures of the travellers; the one finding the ale-house the most memorable feature of the country; the other having a preference for old graveyards. The book is interesting chiefly for those who study the characteristics of the seventeenth century; at the same time it shows remarkably how in most cases the various Scottish towns have undergone a change for better or worse; for instance, Glasgow is universally acknowledged to have been in the seventeenth century "far exceeding Edinburgh in situation and cleanness."

Conway, W. M.—Climbers' Guide to the Central Pennine Alps. London, T. Fisher Unwin, 1890: 12mo, pp. viii. and 156. [Presented by the Author.]

—Climbers' Guide to the Eastern Pennine Alps. London, T. Fisher Unwin, 1891: 12mo, pp. xii. and 152. [Presented by the Publisher.]

—and **Coolidge, W. A. B.** ('Conway and Coolidge's Climbers' Guides'). The Lepontine Alps. London, T. Fisher Unwin, 1892: 12mo, pp. xviii. and 106. [Presented by the Publisher.]

Coolidge, W. A. B., Duhamel, H., and Perrin, F. ('Conway and Coolidge's Climbers' Guides'). The Central Alps of the Dauphiny. [Maps separate.] London, T. Fisher Unwin, 1892: 12mo, pp. xviii. and 248. Price of each guide, 10s. [Presented by the Publisher.]

The editors of this series take primarily a physical view of their subject. They deal in succession with each ridge, catalogue its heights and passes, and show how they may be best reached and crossed, and in what time. They add the names of the first climbers, and in such cases as Mt. Blanc and the Col du Grand, a historical note, coupled with very full literary references. The little volumes may serve, therefore, both as guides in the open, and as subject indexes in the library. Mr. Coolidge adds to the Lepontine volume an interesting little historical excursus on the Teutonic Settlements in the Italian Alps between Monte Rosa and Lago Maggiore. The books are marked by a thoroughness of research and a nicety of production which are as welcome as they are exceptional.

Dormoy, A.—Notions sur le Mâzarat du Seine. Annales Hydrographiques, No. 734 (1892), 44-58.

Description and discussion of the formation of this tidal phenomenon.

Deperet [Prof.], Ch.—Orogénie du Plateau Central. Annales de Géographie, I. (1892): 369-378. With a map.

Useful summary of recent researches into the geological structure and physical constitution of the central plateau of France.

Engelenburg, E.—Hyetographie van Nederland. In the *Verhandelingen der k. Akademie van Wetenschappen* (Amsterdam), xxix. (1892).

Statistics, with maps, of the rainfall of Holland.

Evans [Sir], John.—An Archaeological Survey of Hertfordshire. *Archæologia*, LIII. (1892): 245-262.

A brief account of the chief archaeological finds, with a bibliography, and a map showing Roman roads, towns, and pre-Roman earthworks.

Fief, J. du.—L'Enseignement supérieur de la Géographie en Belgique. Brussels, 1892: 8vo, pp. 27. [Presented by the Author.]

Reprinted from the Bulletin of the Royal Belgian Geographical Society for July, 1892.

Fox, George E.—Recent Discoveries of Roman Remains in Lincoln. *Archæologia*, LIII. (1892): 233-238.

—Excavations on the site of the Roman city at Silchester, Hants, in 1891. *Archæologia*, LIII. (1892): 263-288.

A full description, with large scale plans, of the ancient Roman city recently unearthed at Silchester.

Gallouédec [Prof.], L.—La Sologne. *Annales de Géographie*, I. (1892): 379-389.

The Sologne, which extends from the Cher to the Loire, is described as a clearly-defined region of France, distinguished from the surrounding regions by geological structure, configuration, and climate.

Greim [Dr.], G.—Die Gletschermessungen in den Alpen. *Globus*, LXII. (1892): 113-118.

Grissinger [Dr.], Karl.—Untersuchungen über die Tiefen- und Temperaturverhältnisse des Weissensees in Kärnten, 1892: 4to, pp. 6. Bathymetrical Chart and Temperature Diagram. [Presented by the Author.]

Reprinted from Petermann's 'Mitteilungen,' xxviii., 1892, pp. 153-158. The physical observations on the lake were made in September, 1891.

Haradid [Prof.], A.—Die Insel Lussin, ihr Klima und ihr Vegetation. *Deutsche Rundschau für Geographie*, XIV. (1892): 433-445.

The island of Lussin, in the Gulf of Quarnero, inhabited mainly by Croats and Italians, is described with special regard to climate and flora. There are two illustrations and a map.

Harrou, Alfred.—La Commune de Familleux. *Bulletin, Société Royale Belge de Géographie* (1892): 250-287.

An excellent study in Belgian local geography.

Lelarge, G.—Les Voies de Communication du Monténégro. *Nouvelles Géographiques*, 1892: 112-123.

Map and description of the roads in Montenegro.

Martel, E. A., and Gaupillat, G.—Le Tindoul de la Vayssière (Aveyron). *Revue de Géographie*, 1892 (June): 426-432.

Exploration of the gallery and subterranean river leading from one of the most famous sink-holes in the Causses.

Sowerby, J.—The Forest Cantons of Switzerland. London, Percival & Co., 1892: 8vo, pp. 288. With map.

The chief feature of this book is the mass of information which it contains, and the exhaustive treatment of the various subjects referred to. It does not claim to be more than a compilation from leading authorities; and its aim is to give the tourist in Switzerland some solid information in regard to the four Forest Cantons. The chapters on Political, Constitutional, and Ecclesiastical History are exceedingly compressed, and cannot be considered easy reading. Other chapters are on the trade, customs, literature, and scenery of the four Cantons. The elaborate detail of the book fits it more for reference than for recreation, and it is more likely to be appreciated by the student than by the average tourist.

Strésoff, Georges.—La Macédoine Orientale. *Le Globe*, XXXI. (1892): 73-104. Brief sketch of Macedonia and its people.

Switzerland.—Statistique de la Suisse. 84^e livraison. Les Résultats du Recensement Fédéral du 1^{er} Décembre, 1888. Premier volume. Nombre des maisons, des ménages, et population totale, celle-ci répartie selon l'origine, le lieu de naissance, la confession et la langue maternelle. Publié par le Bureau de Statistique du Département Fédéral de l'Intérieur. Berne, 1892: 4to, pp. 72^e and 287, maps.

Thoulet, Jean.—L'Étude des Lacs en Suisse. *Nouvelles Archives des Missions Scientifiques*. Paris, I. (1891): 61-126.

An account of the systematic researches carried out by the Swiss Government on the physical conditions of lakes.

Uvillier, Gaston.—Bocamadour.—*Le Tour du Monde*, LXIII. (1892): 401-416.

Illustrated account of one of the most remarkably-situated villages in France.

Ward, C. S.—Thorough Guide Series. The Eastern Counties. With a Practical Section on the Rivers and Broads. Twenty-one maps and plans by J. Bartholomew, F.R.G.S. Third edition. London, Dulau & Co., 1892: 12mo, pp. x. and 144. Price 3s. 6d. [Presented by the Publishers.]

In this edition the supply of maps and plans has been largely increased, and the text has apparently been carefully revised. The information relating to the rivers and broads occupies a separate section at the end of the volume.

ASIA.

Babin, C., and Houssay, F.—A travers la Perse Méridionale. *Le Tour du Monde*, LXIV. (1892): 65-128.

MM. Babin and Houssay travelled in 1885 up the Shat-el-Arab to Amarah, thence to Dizful, southward along the margin of the mountains to the head of the Persian Gulf, and thence by Shiraz, Persepolis, and Isfahan to Teheran, returning by the same route to Bushire. Some of the illustrations of ancient monuments and rock inscriptions are finely rendered.

Man [Col.], Alexander.—Formosa: An Island with a Romantic History. *Asiatic Quarterly Review*, IV. No. 7 (1892): 66-73.

Matheson, H. C.—Railways in China. The Formosan Government Railway. Minutes of Proceedings of Institute of Civil Engineers, CIX. (1892): 322-329.

Description, with map, of the Formosan railway in operation and projected.

Müller-Simonis, P., et H. Hyvernât.—Du Caucase au Golfe Persique à travers l'Arménie, le Kurdistan, et la Mésopotamie, par P. Müller-Simonis. Suivie de notices sur la géographie et l'histoire ancienne de l'Arménie, et les inscriptions cunéiformes du bassin du Van, par H. Hyvernât. Paris, 1892: pp. 628, large 4to, maps and illustrations. [Presented by M. Müller-Simonis.]

The authors of the handsome work under review are two Roman Catholic priests, or *abbés*, as they were styled in their passports; one, Henry Hyvernât, a Coptic scholar, now occupying the chair of Assyriology at the Catholic University of Washington; the other his friend and companion, Paul Müller-Simonis, of Strassburg. They were charged by their respective governments with a scientific mission, and had planned an itinerary, to include the more interesting parts of Armenia, Persia, and Mesopotamia; but circumstances obliged them considerably to modify this.

From Constantinople, in the autumn of 1888, they sailed along the southern coasts of the Black Sea, touched at Trebizond, and landed at Batum, once a free port, now a Russian naval and military station closed to British commerce. Proceeding hence by rail, they stopped at Kutais to visit the venerable ruins of Uklumerion Cathedral, founded in 1003, but nearly destroyed by Turkish cannon in 1690, and the convent of Gbelath. Their next halting-place was Tiflis, where, anxious to see something of the grand scenery of the Central Caucasus, they drove, in a jolting Russian *telega* at a breakneck pace, through the Daniel gorge, at the foot of Mount Kasbek, to Vladikavkaz and back again. In Tiflis, according to our authors, Western civilization of the worst kind meets the vice and luxury of the East, rendering Tiflis the resort of the dissolute and the profligate. Leaving this city, the travellers went as far as Akstafa by rail (a place better known recently for a gold mine discovered there), and then began their carriage journey through Armenia. A striking contrast awaited them as they ascended the pass of Kionnorlu, and, turning their backs on the woodland scenery of Georgia, beheld the Highlands of Armenia, wild and bare. Here the vast salt lakes of Sevanga, Urmiah, and Van glisten in the midst of desert surroundings, and huge cones like Ararat rear their colossal forms high above the volcanic plain. Their visit to the valley of the Araxes was well-timed, for they happened to arrive at Erivan just when the festival of Kutil Beyram was being celebrated by the devout Shinto Muhammadans; but our travellers' observations of these extraordinary and characteristic scenes were rudely interrupted by the Russian authorities, who gave them peremptory notice to quit Russian territory. Some ludicrous blunders in the transliteration of Prof. Hyvernât's name, coupled with the discovery of the identity of the courteous and learned Abbé *Iverna*, travelling on a scientific mission, with a person of the name of *Hyvernâtte*, supposed to harbour dark and dangerous designs against the Russian Empire, were the cause of this sudden change in the demeanour of the officials. In short, our authors were allowed but two hours to make their preparations, and were then escorted beyond the confines of Russian Armenia. Once across the Araxes they could breathe freely, as with feelings of relief they bid adieu to "Free Russia." From Julfa they continued their journey to Urmiah, or Urmi, through Persian Kurdistan, and thence travelled westward to Van, in Turkish Armenia. Here again they were doomed to misfortune, for they found the Turkish pasha and his satellites even worse than Russian *chenovniks*; they had, in fact, escaped Scylla only to fall on Charybdis. For a whole month they were obliged to put up with every kind of insult and threat, appealing in vain for help to the foreign consuls and to the French Ambassador. In order to understand their position aright, the reader must be reminded of the efforts made by the Church of Rome to establish missions in Armenia, of the ill-feeling caused by this propaganda among the representatives of all the other Christian churches and sects, of the ascendancy of the Russian Consul, and of the humiliating rôle played by the English representative. All this is well told in Chapter xii.

Leaving Van, and the worthy Dominican fathers under whose roof they had shared board and lodging, MM. Müller-Simonis and Hyvernât, having provided themselves with guides and equipped their expedition, started on their journey

to Mesopotamia. They skirted the northern and western shores of Lake Van, passed at the foot of Sipantagh, famous for its legends, rested at Ardjich, the *Arzisi* of Marco Polo, Adeldj vas, or Ardzgué, with its romantic ruins, Akbiat, the site of architectural remains of the Tartar chiefs of the 15th century, and arrived at Bitlis, the principal town of Kurdistan. Chapter xviii. is devoted to Bitlis, Saird, and Boghtán, with its reminiscences of the retreat of the Ten Thousand. Chapter xix. takes us from Saird to Djézireh; Chapter xx. from Djézireh to Mosul. This last-named city is described in Chapter xxi., where some interesting particulars will also be found on the ruins of Nineveh, the excavations recently made there, and on the Syrian and Chaldean churches. Chapter xxii. describes an excursion made by our travellers to Khorsabdd, the Versailles of King Sargon. Chapter xxiii., "from Mosul to Baghdad," continues to traverse ground dear to the Assyriologist and historian, passing by Kalab, the capital of Nimrod and Tekrit, celebrated in early Christian annals as the scene of so many martyrdoms that it earned the name of "Martyropolis," celebrated long afterwards as the birthplace of the terrible Saladin. At length the minarets and palm trees of Baghdad, reflected in the pure waters of the Tigris, were in sight. Chapters xxiv. and xxv. are entitled respectively "Babylon" and "Baghdad," and Chapter xxvi. describes the journey from Baghdad to Bassora, on the Persian Gulf. This concludes the narrative, but not the travels, for our authors, having taken their passage to Bombay, landed on a friendly soil, and were received with such courtesy and hospitality by Lord Reay, then Governor of Bombay, that they decided on remaining six weeks in India. This enabled them to draw a comparison between the English system of governing a dependency and that of Russia, the conclusions founded on their observations finding expression in their book (Chapter vii.). The appendix on the ancient geography of Armenia will prove of special interest to the historian and Assyriologist, and the catalogue of cuneiform inscriptions, published and unpublished—Vannic and Armeniac—will be found useful by the student of this branch of Oriental research. In conclusion, we invite attention to the illustrations from photographs by the authors, reproduced by the phototype process by Obermeyer, of Munich. They are remarkably well executed, and a good map accompanies the work.

[E. D. M.]

Sachau, Eduard.—Zur historischen Geographie von Nordsyrien. Sitzungsberichte der Akademie der Wissenschaften zu Berlin (1892): 313-338.

Researches into the identification of historical sites in Northern Syria.

Tao, Ong.—Le Song-thu-bon et la baie de Tourane. Bulletin de la Société de Géographie Commerciale de Paris, XIV. (1892): 187-201, with map.

An account of Tourane, the Port of Hué, its sheltered harbour, and the River Song-thu-bon, and its value as a means of communication with the interior of Annam.

Varat, Charles.—Voyage en Corée. Le Tour du Monde, LXIII. (1892): 289-352.

AFRICA.

Junker [Dr.], Wilhelm.—Reisen in Afrika, 1875-1886. Dritter Band (1882-1886). Nach seinen Tagebüchern bearbeitet und herausgegeben von dem Reisenden. Mit Illustrationen und 10 Karten. Wien und Olmütz, Eduard Helzel, 1891: 8vo, pp. xvi. and 740.

[———].—Travels in Africa during the Years 1882-1886. Translated from the German by A. H. Keane, F.R.S. London, Chapman and Hall, 1892: 8vo, pp. viii. and 586. Price 21s. [Presented by the Publishers.]

This volume deals with the second part of Dr. Junker's last African journey. At the end of 1881 he left the Niam-niam chief, Bakungai (see 'Proceedings,' 1891, p. 442), and continued his journey, first going east till he

reached Kanna, and then north and north-east through primeval forests to Tangasi, where he arrived in February, 1882. He then went east and afterwards south, first crossing the watershed of the Bomokandi and Gadda, and then proceeding to Gambari and Bangusa, whence he pushed forward south to Maljegbe, in the Mangballe country, crossing the Bomokandi in its upper course. Having returned to Gambari, he succeeded, in spite of a severe illness and other hindrances, in marching southward through unexplored country to the Nepoko River, which he reached in $2^{\circ} 10'$ N. lat. Detention as a hostage by the Mangbattu chief, Sanga Mombele, and the great privations he suffered, delayed Dr. Junker's return to Tangasi until July, 1882. His state of health, the want of bartering articles, provisions, etc., made it necessary for him to return to Semio's zeriba, where Bohndorff awaited him. The latter was now ordered to return to Europe by the Bahr-el-Ghazal and Khartum. Dr. Junker intended to follow after another journey to the Welle, and he succeeded in reaching that river at Bagbine in January, 1883. From there he travelled by a westerly route to Duare and Kansingo, in the Bandjia country, and came again to the Welle, near Ali Kobbo's zeriba, close to the farthest point which Van Gèle reached in July, 1880. Then Dr. Junker returned to Semio's zeriba, where he was compelled to remain from May to November, 1883, by disquieting news from Lupton Bey. Everything was ready for the march to the north, when suddenly the tidings arrived that all the military stations north of Ganda had been occupied by the Mahdists, and that Lupton was afraid he would be unable to repulse the rebels. Dr. Junker thereupon decided to travel east to his old friend Ndoruma, and from there to Emin Bey's chief quarters on the Nile at Lado. At Ndoruma's, he found his old station completely destroyed, and therefore he hurried on to the north-east, passing Emin's stations Kabayendi and Wundi, and arriving at Lado on January 21st, 1884. Here he met Emin Bey. Patiently Dr. Junker waited month after month for an opportunity to proceed to the north. Towards the end of May, 1884, Lupton wrote that the Mahdists were only six hours from the Mudirich, and a few days later it became known at Lado that the Bahr-el-Ghazal Province was in the hands of the Mahdists, and Lupton a prisoner. Karam Allah, the successful Mahdist officer, at once sent letters to Lado to surrender, and for the Europeans to appear before him at the Mudirich. The remarkable fact is recorded that Emin and his officers actually decided to surrender the Equatorial Province without resistance. Dr. Junker, not for one moment entertaining the thought of giving himself up to Karam Allah, decided to retreat up the Nile to the Albert and Victoria Lakes, and, if necessary, from there to Zanzibar. For a time he took up his quarters at Dufile, and as an attack of the Mahdists took place, he returned to Lado. Meanwhile, Emin had concentrated the western contingent of his forces at Amadi and Makaraka, and in January, 1885, he commenced the evacuation of Lado. Junker left this place for the second time on January 26th, 1885, still expecting help from Khartum (which was already in the hands of the Mahdists), and travelled to Anfiia, on the Somerset Nile. In April news came of the capture of Amadi and Makaraka. Soon afterwards Karam Allah informed Emin of the fall of Khartum, but the Mahdists still hesitated to attack the Province, and as rumours of approaching English troops reached Equatoria, Junker rejoined Emin, who was then at Wadelai. But no help arrived, and he finally set out in January, 1886, crossed the Albert Nyanza, and was detained at Kabarega's residence during February, as war had broken out between Unyoro and Uganda. Ultimately he reached the capital of Uganda, where he was most cordially received by the English and French missionaries. Mwanga allowed Dr. Junker to continue his journey, and by the assistance of the English missionaries, he safely reached Msalala. From there he travelled through Usukuma and Unyamwezi to Tabora, where he met Tipu Tih, in whose company he reached the Indian Ocean in December, 1886.

Much of this volume is devoted to the Mahdist rebellion, and to the state of affairs in Equatoria, which so greatly influenced the last part of Dr. Junker's journey. Fresh light is thrown on the power and character of Emin. Dr. Junker proves that the hesitation of the Mahdi's emir, Karam Allah, to advance towards Lado was the only reason why Emin kept his position; that Emin

intended to retreat with the Egyptians to Uganda and Zanzibar (pp. 629, 631, and 632); and that he could not act freely, but depended greatly upon the opinion of his subordinates, being unable to enforce obedience. In the light of these and many other statements of Dr. Junker, it becomes plain that Mr. Stanley's treatment of the state of affairs in Equatoria was the only possible solution of Emin's difficulties.

The scientific results contained in this volume are not less important than those of the previous parts of Dr. Junker's journey. His further study of the course of the Welle River must take the first place, as it formed the basis of Van Oele's and Roget's later explorations. The courses of many tributaries were discovered by Dr. Junker, and laid down on his most carefully-drawn maps, the most important being the Mbomu, Mbili, and Bomokandi. The exploration of the Nepoko, and the additional detailed mapping of the countries of the Upper Nile regions and of his route through East Africa, were also valuable services to geography. Moreover, the book contains much valuable ethnological information. Dr. Junker found the southern branches of the great Niam-niam nation to be in most respects similar to the tribes living north of the Welle, although in some cases they have adopted Mangbattu manners and customs. Besides the Niamniam, the various Momfu and Mabode tribes are the most important inhabitants of these regions. The former differ considerably from their more western neighbours, the A-Bangba, Mangballe, Mugo, Moje, A-Bissanga, and others, which are all relatives of the Mangbattu, and very similar to each other. The Momfu, on the other hand, have their own language, and their anthropological characteristics differ from the Mangbattu group, the cranium being less dolichocephalic, and the colour of their skin of a darker shade than the Mangbattu. The Mabode are more like the Momfu than the Mangbattu. They have, however, their own language, and are in various other respects different from the former. Junker believes that many of the tribes which Stanley met with on his last journey are near relatives to, or identical with, the Momfu and Mabode. Dr. Junker's information about the pygmy tribes south of the Welle are of the highest ethnological value. They live as hunters in the territory of the Mabode and in Sanga's district. The Momfu call them Affili; but their proper name is Atshua, or Wotshua, which Junker regards as identical with "Batua." Their average height is a little above four feet, and some tribes of them represent the most southern group of the Akka pygmies, whilst others are identical with the Wambutti and Southern Batua. Dr. Junker objects to the theory that the pygmies are merely degenerate negroes, and emphasises the fact that they represent a widely-extending and very important African race, differing greatly from all other natives of Central Africa.

Like the former volumes, the present one contains many new botanical and zoological details, as well as practical hints about agriculture, commerce, etc. Dr. Hassenstein's excellent maps accompanying the book, and many of the ethnological illustrations, especially those drawn by Dr. Schweinfurth, are valuable additions to the text.

The English translation by Mr. Keane is admirably done, with judicious condensation which in no way detracts from the value of the book.—[H. S.]

Nebout, Albert.—*La Mission Crampel. Le Tour du Monde, LXIV. (1892): 1-64.*

A detailed account of this ill-fated journey, with numerous illustrations drawn by Mme. Paul Crampel.

Pied [Rev.].—*De Porto-Novo à Oyo. Les Missions Catholiques, 1892: pp. 231-236, 240-250, 265-267, 287-291, 300-303, 312-315, 321-327, 358-360, 374-376.*

The journey of a French missionary in the Yoruba country, with interesting particulars of places and people.

Schirmer, Henri.—*Le Tount. Annales de Géographie, I. (1892): 401-414.*

Recapitulation of what is known regarding the oasis of Tunt.

AMERICA.

Brinton [Dr.], D. G.—The Tribute Roll of Montezuma. *Transactions of American Philosophical Society*, XVII. (1892): 53-61.

The tribute roll of Montezuma is facsimiled in six plates. The explanatory letterpress is by Dr. Brinton, Mr. H. Phillips, jun., and Dr. Cheston Morris. The original roll, which was obtained from Mexico in 1830 by the American Philosophical Society, is painted on maguey paper made from agave fibre. It is here reproduced exactly in the original colours.

[Buenos Ayres.]—Anuario Estadístico de la Ciudad de Buenos Aires. Año I. 1891. Buenos Aires, 1892: 4to, pp. xvi. and 607.

A statistical account of the city of Buenos Ayres.

Collens, J. H.—The Trinidad Official and Commercial Register and Almanack, 1892. Port of Spain, 1891: 8vo, pp. 160. Price 3s. [Presented by the Compiler.]

Includes a brief account of the Islands of Trinidad and Tobago.

Ehrenreich [Dr.], P.—Beiträge zur Geographie Central-Brasilien. *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, XXVII. (1892): 121-152.

This is the continuation of Dr. Ehrenreich's memoir on Central Brazil, and deals with the Araguaia and Lower Tocantins region. A map of the rivers is given.

Erbach, Eberhard Graf zu.—Wandertage eines deutschen Touristen im Strom- und Küstengebiet des Orinoko. Leipzig, Theodor Thomas, 1892: 8vo, pp. 460.

Besides the narrative of the author's travels, this volume contains much interesting information on the social and political condition and the history of Venezuela. There are numerous illustrations.

Gelcich, E.—Übersicht der Entdeckungsreisen, welche unternommen wurden, um die Nordwestküste Amerikas zu erforschen. *Mittheilungen der k.k. Geographischen Gesellschaft in Wien*, XXXV. (1892): 261-371.

An exhaustive summary of voyages of discovery along the north-west coast of North America, illustrated by nine maps, showing the gradual discovery of the true outline and relations of the continent.

MacKay, A. H.—Pictou Island. *Proceedings of Nova Scotian Institute of Science*, I. (1891): 76-83.

A topographical and geological description of this island in Northumberland Strait.

Magellan, Straits of, &c.—Derrotero del Estrecho de Magallanes, Tierra del Fuego i Canales de la Patagonia. Desde el Canal de Chacao hasta el Cabo de Hornos. Santiago de Chile, 1891: large 8vo, pp. xviii. and 596, plates. [Presented by the Chilean Hydrographic Office.]

A Directory for the Straits of Magellan, Tierra del Fuego, and the Channels of Patagonia, edited by Captain Ramon Serrano.

Olinda [Dr.], Alexander.—Der Nicaragua-Canal nach Studien an Ort und Stelle. *Deutsche Rundschau für Geog. und Statistik*, XIV. (1892): 385-396.

Patterson [Rev. Dr.], George.—The Magdalena Islands. *Proceedings of Nova Scotian Institute of Science*, I. (1891): 31-57.

The Magdalena Islands are situated in the middle of the Gulf of St. Lawrence.

Polakowsky [Dr.], H.—Prof. H. Pittiers Forschungsreise durch den südwestlichen Teil von Costarica. 'Petermann's Mitteilungen,' XXXVIII. (1892): 1-8, 139-142, 158-162.

Purpus, C. A.—Der Pretannie-Lake bei Lytton in Britisch Columbia. Das Ausland, LXV., 1892: 392-394, 403-406.

Rivière [Baron], H. A. de.—Explorations in the Beni Province. Bulletin of American Geographical Society, xxiv. (1892), 204-214.

Account, with maps, of a journey in 1886 in the Beni province of Bolivia, with special reference to gold washings.

AUSTRALASIA.

[**New Zealand.**].—Reports of Geological Explorations during 1890-91, with maps and sections. Sir James Hector, Director. Wellington, 1891: 8vo, pp. lxxiv. and 178. [Presented by the Geological Survey of New Zealand.]

OCEANIA.

Ijzerman, J. W.—Beschrijving der Oudheden nabij de Greus der Residentie's Soerakarta en Djogdjakarta. Batavia, 1891. 4to, pp. 135 (with atlas containing large scale map and numerous plates). [Presented by the Batavian Genootschap van Kunsten en Wetenschappen.]

A description, with very detailed plans, sketches, and numerous photographs, of the Brahmanical and Buddhist temples of central Java.

Keane [Prof.], A. H.—Eastern Geography. A Geography of the Malay Peninsula, Indo-China, the Eastern Archipelago, the Philippines, and New Guinea. Second edition, revised. London, E. Stanford, 1892: cr. 8vo, pp. xii. and 192, map. Price 5s. [Presented by the Publisher.]

The first edition of this work appeared in 1887, and was noticed in the 'Proceedings' for that year, p. 521. In the present edition the statistics have been brought down to a recent date.

Snelleman, Joh. F.—Bijdragen tot de Kennis der Fauna van Midden-Sumatra. Leiden, E. J. Brill, 1892: small 4to, paged separately. Plates.

This forms the last instalment of the volume dealing with the fauna of Sumatra in Professor Veth's great work on Sumatra, summarising the results of the expedition of 1877-79. It contains a series of monographs on the insects collected by the expedition by different specialists, and is illustrated by magnificent coloured plates.

Sundermann, H.—Kleine Niassische Chrestomathie mit Wörterverzeichnis. Bijdragen tot de Taal Land- en Volkenkunde van Nederlandsch-Indië (6 ser.), VIII. (1892): 335-453.

Specimens of the language of the islanders of Nias, off the west coast of Sumatra, with a vocabulary, and German translation.

POLAR REGIONS.

[**Polar Exploration.**].—An Expedition to the North Magnetic Pole. Bulletin of American Geographical Society, xxiv. (1892), 215-261.

Report of a discussion on Colonel Gilder's proposed journey to the North Magnetic Pole, in which Professor Trowbridge, Mr. C. A. Schott, Professor Mayer, and General Greeley took part.

No. X.—OCTOBER 1892.]

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GENERAL.

Aitoff, D.—Note sur la projection zénithale équidistante et sur le canovas qui en est dérivé. *Nouvelles Géographiques*, 1892: No. 6, p. 87-90.

Contains tables for constructing maps on the equidistant zenithal projection, which is much superior to the modified conic for large areas.

Baguet, M. A.—Christophe Colomb. *Bulletin Société Royale de Géographie d'Anvers*, XVI. (1892): 318-342.

Bigelow, Frank H.—Notes on a New Method for the Discussion of Magnetic Observations. (United States Department of Agriculture, Weather Bureau, Bulletin No. 2.) Washington, D.C., 1892: 8vo, pp. 40, plate.

Binnie, A. R.—On Mean or Average Annual Rainfall, and the fluctuations to which it is subject. *Minutes of Proceedings of Institute of Civil Engineers*, CIX. (1892): 89-172.

A valuable paper of considerable geographical importance, published with discussion by Dr. Buchan, Mr. G. J. Symons, and others.

[**Church Missionary Society.**]—Proceedings of the Church Missionary Society for Africa and the East. Ninety-third year, 1891-92. London, 1892: 8vo, pp. (lxxix.) 258, and (331). [Presented by the Church Missionary Society.]

This volume is mainly occupied with the annual report, containing a brief review of the Society's work during the year, illustrated with a series of maps showing the various stations of the Society.

Dictionary of National Biography.—Edited by Sidney Lee. Vol. XXXI. Kennett—Lambart. London: Smith, Elder & Co., 1892: large 8vo, pp. vi and 448. Price 15s.

The following names, more or less connected with geography and travel, appear among the notices in this volume:—Admiral Augustus Keppel, by Professor J. K. Laughton; G. T. Keppel, Earl of Albemarle, by H. Manners Chichester; Captain James King, by Professor J. K. Laughton; Philip Gidley King, by Stanley Lane-Poole; Philip Parker King, by Professor J. K. Laughton; Richard King, by Thomas Seecombe; Samuel William King, by W. A. J. Archbold; Sir John Macdonald Kinneir, by H. M. Chichester; John Kitto, by the Rev. T. Hamilton, D.D.; James Knight, by Professor J. K. Laughton; John Knight, by the same; Robert Knox, by Gordon Goodwin; Alexander Gordon Laing, by H. M. Chichester; Samuel Laing, by J. M. Rigg; and Macgregor Laird, by H. M. Chichester.

Dubois, Marcel.—Examen de la Géographie de Strabon, Étude critique de la méthode et des sources. Paris, A. Colin & Co., 1891: 8vo, pp. xxvi. and 390.

Girard, Jules.—Études de géographie littorale. *Revue de Géographie*, XVI. (1892): 81-93, 183-196, 243-258.

A memoir on the forms of coasts, with reference to the movement of sand forming bars, river deposits building deltas and to fjords.

Gunter, S.—Die erste Anwendung der gnomonischen Kartenprojektion. *Das Ausland*, LXV. (1892): 520-523.

A critical note, giving particulars of the earliest appearance of charts on the gnomonic projection.

Hennessey, Henry.—On the Physical Structure of the Earth. Reprinted in *Annual Report of the Smithsonian Institution for 1890*: 201-219.

Mill [Dr.], H. E.—An Elementary Class-book of General Geography. London, Macmillan & Co. Second edition, 1892: 8vo, pp. xiv, and 382. Illustrations. Price 3s. 6d. [Presented by the Author.]

The first edition was noticed in the 'Proceedings,' XI. (1889), p. 576. Thorough revision has since been made, inaccurate or exaggerated statements formerly accepted on inadequate authority removed, and the statistics brought up to date. The spelling of place-names has been assimilated to that employed in the other volumes of Macmillan's Geographical Series.

The following works have also been added to the Library:—

Burton, Richard F.—Camœns: His Life and His Lusads. A Commentary. 2 vols. London, B. Quaritch, 1881: 12mo, pp. vii. and 738.

Cudmore, P.—The Civil Government of the States, and the Constitutional History of the United States. New York, 1875: 8vo, pp. 262.

Miller [Dr.], William.—The Least of All Lands. London, Blackie & Son, 1888: 8vo, pp. 247.

A series of essays on scriptural sites, in which the aid of topography in elucidating history is employed with exceptional power and success.

Roosevelt, Theodore.—Hunting Trips of a Ranchman: Sketches of Sport on the Northern Battle Plains. London, Kegan Paul, Trench & Co., 1886: pp. xvi. and 347.

Ruge [Dr.], Sophus.—Abhandlungen und Vorträge zur Geschichte der Erdkunde. Dresden, 1888: 8vo, pp. 268.

Vincent, Frank.—In and Out of Central America. New York, Appleton & Co., 1890: 8vo, pp. 246, maps and illustrations.

Wallace, Robert.—The Rural Economy and Agriculture of Australia and New Zealand. London, Low & Co., 1891: 8vo, pp. xvi. and 541, maps and illustrations.

NEW MAPS.

(By J. COLLES, *Map Curator, R.G.S.*)

EUROPE.

Balkan-Halbinsel.—Politische Wandkarte der —. Schul-Wand-Atlas der Länder-Europas. Lief. 8. Von Richd. Kiepert. Scale 1:1,000,000, or 13·6 geographical miles to an inch. 6 sheets. D. Reimer, Berlin. Price 7s. 6d. (*Dulaeu.*)

England and Wales.—Indexed Pocket Map of —. Scale 1:1,025,000, or 14 geographical miles to an inch. Rand, McNally & Co., Chicago and New York. Price 4s. 2d. [Presented by the Publishers, through E. Stanford, Esq.]

France.—Carte Géologique de la —, 1:80,000, or 1·1 geographical miles to an inch. Feuilles 72, Quimper; 94, Beaupré; 176, Monistrol. Avec notices explicatives. Each sheet 5s. (*Dulaeu.*)

— Carte de la —. Scale 1:200,000, or 2·7 geographical miles to an inch. Dressée par le Service Géographique de l'Armée. Feuille 45, Poitiers. Paris, Dépôt de la Guerre. Price 1s. 6d. (*Dulaeu.*)

France.—Indexed Pocket Map of —. Scale 1:1,020,000, or 14 geographical miles to an inch. Rand, McNally & Co., Chicago and New York. Price 4s. 2d. [Presented by the Publishers, through E. Stanford, Esq.]

Ireland.—Indexed Pocket Map of —. Scale 1:720,000, or 9·8 geographical miles to an inch. Rand, McNally & Co., Chicago and New York. Price 4s. 2d. [Presented by the Publishers, through E. Stanford, Esq.]

London.—New Plan of North —, by J. Bartholomew, F.R.G.S. Scale 3·7 inches to 1 geographical mile. London, W. H. Smith & Son. Price 2s.

Russie d'Europe.—Carte Géologique Générale de la —, publiée par le Comité Géologique, 1890. Scale 1:420,000, or 5·9 geographical miles to an inch. Feuille 126, Perm, Solikamsk. Dressée par A. Krasnopolsky, P. Krotow, A. Zaytzeff, et A. Stuckenborg. With explanatory notes by A. Krasnopolsky. Librairie Eggers et Cie., à St. Pétersbourg, 1891.

Scotland.—Geological Map of —, reduced chiefly from the Ordnance and Geological Surveys under the direction of Sir Archibald Geikie, B.Sc., LL.D., F.R.S., Director-General of the Geological Survey. Topography by John Bartholomew, F.R.G.S. Scale 1:633,600, or 8·7 geographical miles to an inch. With descriptive text. John Bartholomew & Co., Edinburgh, 1892. Price 6s. [Presented by the Publishers.]

In the production of this excellent map use has been made of Mr. Bartholomew's new map, reduced from the Ordnance Survey to the scale of 10 miles to an inch, and the consent of the Controller of Her Majesty's Stationery Office, who has charge of the copyrights of Government publications, was given to make use of the results obtained by the Geological Survey, thus enabling the author to produce a more accurate representation of the general geology of Scotland than has hitherto been possible. The geological lines, traced by the officers of the Survey, have, as far as the scale permits, been put on the map. For those parts of the country of which the official geological mapping has not been completed, the maps of MacGulloch, Nichol, and others have been used. Accompanying the map is a general descriptive text, written by Sir Archibald Geikie, chiefly for the use of persons who have no special knowledge of Scottish geology, but who desire to gain some insight as to the nature of the rocks which determine the varying character of the scenery.

As a specimen of this class of cartography, the map leaves nothing to be desired. The colours are well chosen, and it reflects credit on all concerned in its production.

—.—Indexed Pocket Map of —. Scale 1:750,000, or 10·3 geographical miles to an inch. Rand, McNally & Co., Chicago and New York. Price 4s. 2d. [Presented by the Publishers, through E. Stanford, Esq.]

ORDNANCE SURVEY MAPS.

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1-inch—New Series.—

ENGLAND AND WALES: 205, 242, engraved edition, 206, 276, 291, 297, 341, 355, photo-zincographed edition, 1r. each.

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CXXXIV. 9, CXXXVI. 9, 6s. each; 12, CXXXIX. 8, CCLIX. 2, 8, 7, 6s. each; 7, 5s.; 10, 4s.; 11, 3s.; 12, 13, 14, 15, CCLXXIV. 15, 5s.; CCLXXV. 3, 4, 7, 8, 6s. each; CCLXXVI. 2, 3s.; 3, 4, 5, 7, 8, 9, 10, 13, 4s. each; 14, 3s.; CCLXXVII. 1, 2, 3, 4, 5, 6, 8, 11, 12, 15, 16, 4s. each; CCLXXVIII. 1, 5s.; 2, 5, 6, 9, 4s. each; 10, 3s.; CCLXXIX. 3, 4, 9, 11, 4s. each (coloured).

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(Stanford, Agent.)

ASIA.

India.—Indexed Map of British —. Scale 1:1,300,000, or 17·8 geographical miles to an inch. Rand, McNally & Co., Chicago and New York, 1891. Price 3s. 2d. [Presented by the Publishers, through E. Stanford, Esq.]

Perak.—New Sketch Map of the Protected Malay State of —, 1892. Scale 1:253,310, or 3·47 geographical miles to an inch. Compiled in the Office of the Trigonometrical Survey, from various explorations and surveys, by Geo. S. Lefroy, A.M.I.C.E., F.G.S., Chief Surveyor of the State. London: Stanford's Geographical Establishment. [Presented by E. Stanford, Esq.]

This is an important map, showing the results of recent surveys up to the present time. All existing means of communication are shown, as well as the railways under construction, and projected. The approximate heights are given in feet, and the positions of all trigonometrical stations indicated. A table containing statistics of Perak, such as areas, population, lengths of roads and railways, revenue, expenditure, navigable rivers, &c., is also given. The map is clearly drawn, and printed in five colours.

AFRICA.

Afrika.—Spezial-Karte von —, im Massstab von 1:4,000,000, or 55·5 geographical miles to an inch. (10 Blatt.) Entworfen von Hermann Habenicht, bearbeitet von demselben, Bruno Doman und Dr. Richard Lüddecke. IV. Lieferung (containing sections 9 & 10). Dritte Auflage. Gotha: Justus Perthes, 1892. (Dular.)

Section 9, Capland, embraces the greater part of the Cape Colony, the Orange Free State, the Western part of the South African Republic, Bechuanaland, Namaqualand, and Damaraland. Section 10, Delagoa Bay, includes South-East Africa between the parallels of 16° and 32° S. lat., and the southern portion of Madagascar. Insets are given of the islands of Réunion and Mauritius. As usual with this map, the present issue is accompanied by letter-press, in which all the authorities consulted in the compilation of these two sections are mentioned. This map is so well and favourably known to geographers, that there is no necessity to comment upon the style in which it has been produced.

Deutsch Ost-Afrika.—Scale 1:1,000,000, or 12·6 geographical miles to an inch. Deutsche Kolonialgesellschaft. Berlin, 1892. Zweite verb. Auflage. 6 sheets. [Presented by the Deutsche Kolonialgesellschaft, Berlin.]

This map is drawn in a bold style, and is well adapted for a wall-map. The lettering is clear, it is not overcrowded with names, and the boundaries of the several spheres of influence are well shown.

AMERICA.

United States.—Indexed County and Township Pocket Maps and Shipper's Guides of Massachusetts (scale 1:455,000, or 6·2 geographical miles to an inch).

Nevada (scale 1:1,780,000, or 24·8 geographical miles to an inch). North Carolina (scale 1:1,640,000, or 22·5 geographical miles to an inch). Virginia (scale 1:855,000, or 11·7 geographical miles to an inch). West Virginia (scale 1:920,000, or 12·6 geographical miles to an inch). Rand, McNally & Co., Chicago and New York. Price 1s. 1d. each. [Presented by the Publishers, through E. Stanford, Esq.]

CHARTS.

Admiralty.—Charts and plans published by the Hydrographic Department, Admiralty, in July and August, 1892. [Presented by the Admiralty, through the Hydrographer.]

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1578	m	=	0·16	Africa :—Lake Nyassa (southern portion). Plans, Lunsumbwe, or Monkey Bay. Old Livingstonia. Chisumulu. M'Bampa Cove. Kaango. Chisanga. Pachia. Sumba. Chikole. M'Luluka. Loeswa. Chilowelo. 2s. 6d.
1002	m	=	0·69	Madagascar, north coast :—Diego Suarez Bay to Andranomombi Bay. 2s. 6d.
1649	m	=	0·75	Borneo, north coast :—Lankayan to Sandakan Harbour. 2s. 6d.
1650	m	=	0·75	Borneo, north coast :—Mallawallé Island to Lankayan. 2s. 6d.
2042	—	—	—	Sydney Harbour :—Plan added, South Sydney.

(J. D. Potter, Agent.)

CHARTS CANCELLED.

No.		Cancelled by	No.
1486	Gynfelin Patches. Aberystwith, and New Quay	New plans. Barmouth. Aberdovey. New Quay Bay. Aberystwith	1464
1487	Aberdovey Harbour. Barmouth Harbour		
1676	Gulf of Patras	New plan. Gulf of Patras and approaches	1676
249	Mahedia to Ras, Makhabez	New chart. Mahedia to Ras Makhabez	249
299	Harbours on west coast, Newfoundland	New plan. Old Férolle Harbour and Brig Bay	299
609	River Gambia, Sheet 2	New chart. River Gambia, Sheet 2	609

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 1598, English Channel. 1825b, Irish Channel:—Southern sheet. 1471, Ireland:—Kingstown Harbour. 2305, Norway:—Sheet 3; Stavfjord to Romsdals Islands. 2694, France, west coast:—Channels between Ile D'Ouessant and the mainland. 72, Spain, west coast:—Port of Huelva, and entrance to Rivers Tinto and Odier. 1758, Spain, west coast:—Arosa and Pontevedra Bays. 469, Mediterranean:—Port of Alicante. 201, Adriatic Sea:—Gulfs of Venice and Trieste. 390, Newfoundland:—Pistolet Bay. 1003, Africa, east coast:—Fungus River. 934, Eastern Archipelago:—Surabaya, etc. 2681ab, China Sea:—Northern portion, 2 sheets. 270, China Sea:—Macclesfield Bank. 1459, China, south coast:—Hongkong Harbour. 358, Japan:—The western coasts of Kinsu and Nipon. 2436, Japan:—Port Unteng. 127, Japan:—Hirado-no-Seto to Simono-seki Strait. 536, Japan:—Sado Island and adjacent coasts of Nipon. 140, Japan:—Matsushima to Atsusi-no-O-sima, including Hirado Island and Goto Island. 1047, Australia, north-west coast:—Cape Ford to Buccaneer Archipelago.

(J. D. Potter, Agent.)

French Charts.—No. 4585, Baie de Djibouti, Golfe de Tadjarah, 1892. 4647, Ports et Mouillages sur la Côte de Colombie et de Vénézuéla:—Bahia Honda, Baie Estanques, Mouillage de Comarico, Port Chichirivichi, Port de Tunamo, Mouillage de Cumana, 1891. 4608, Plan de la Baie du Prony (Partie Sud de la Nouvelle-Calédoine), 1892. Service Hydrographique de la Marine, Paris. [Presented by the Service Hydrographique de la Marine, Paris.]

United States Charts.—No. 1290, The West Indies with the Gulf of Mexico and Caribbean Sea. Compiled from the latest information.—No. 1335. Topolobampo Harbour, Gulf of California. Pilot Chart of the North Atlantic Ocean. September, 1892. Published at the Hydrographic Office, Bureau of Navigation, Navy Department, Washington, D.C. Richardson Clover, Lieutenant Commander, U.S.N., Hydrographer. [Presented by the U.S. Hydrographic Office.]

ATLASES.

Berghaus' Physikalischer Atlas.—(Begründet 1836 von Heinrich Berghaus.) 75 Karten in sieben Abteilungen, enthaltend mehrere Hundert Darstellungen über Geologie, Hydrographie, Meteorologie, Erdmagnetismus, Pflanzenverbreitung, Tierverbreitung und Völkerkunde. Vollständig neu bearbeitet und mit Mitwirkung von Dr. Oscar Drude, Dr. Georg Gerland, Dr. Julius Hann, Dr. G. Hartlaub, Dr. W. Marshall, Dr. Georg Neumayer, und Dr. Karl v. Tittel. Herausgegeben von Prof. Dr. Hermann Berghaus. Fünfundzwanzigste (Schluss-) Lieferung. Nr. 4, Grund und Boden. Nr. 7/8 Uebersicht der Erde. Titel und Vorbemerkungen zum Atlas der Geologie. Titel, Vorwort und Inhalt zum Gesamtausgabe. Gotha, Justus Perthes, 1892. Price 3s. each part. (Dulau.)

The issue of this part completes the best and most comprehensive physical atlas that has ever been published. It was commenced in 1836, and it is difficult to understand how the immense amount of work entailed in its compilation could have been so thoroughly done in the time that has elapsed since that date. The maps are all beautiful specimens of cartography, and great skill has been shown in the manner in which symbols and colours have been chosen to illustrate the numerous subjects it contains. By the system adopted each set of maps referring to one subject, such as geology, meteorology, &c., forms a complete atlas, with titlepage and letterpress, and can be obtained separate. The following price list may be useful, and is therefore

given for the benefit of our Fellows:—Geology, 19s.; Hydrography, 15s.; Meteorology, 16s.; Terrestrial Magnetism, 8s.; Botany, 11s. 6d.; Zoology, 12s. 6d.; Ethnology, £1. Any map can be had separate for 1s. 3d.

The editors and publisher are to be congratulated on the very satisfactory manner in which they have brought their arduous undertaking to so successful a conclusion.

Schrader, F.—*L'Année Cartographique. Supplément Annuel à toutes les publications de Géographie et de Cartographie, dressé et rédigé sous la direction de F. Schrader, Directeur des Travaux Cartographiques de la Librairie Hachette et Cie. Deuxième Supplément, contenant les Modifications Géographiques et Politiques de l'Année 1891. Paris: Librairie Hachette et Cie., 1892. Price 3s. 6d. (Dulau.)*

This is the second annual supplement to Geography and Cartography, edited by Mr. F. Schrader, and published by Hachette & Co. It contains three sheets of maps, on which all the more recent explorations, geographical discoveries, and changes in the political boundaries of Asia, Africa, and America, are laid down. On the sheet having reference to Asia the routes of General Perlov and M. Bogdanovitch through Eastern Turkestan to the borders of Tibet are shown on three maps. The other portion of this sheet is occupied by a map of Indo-China, on which the explorations of Pavie and others are indicated. In addition to these, a small map of Europe and Asia is given, on which all countries which have been surveyed are distinguished by colour from those which have not, and from others which are either only partially known or entirely unexplored.

On the sheet devoted to Africa there are seven maps, showing the changes that have been made in the political boundaries; the recent explorations in the country between the Congo and Lake Chad, a map of oasis of Tuat, and others illustrating the journeys of Jackson, Gedge, and Schynse, in the neighbourhood of Victoria Nyanza, and the routes of recent explorers in Madagascar and Somaliland.

The remaining sheet is devoted to maps illustrating the political boundaries of the South American States, with the exception of two, on one of which the most recent journeys of M. H. Coudreau in French Guiana are laid down, the other being a small map of Canada, showing approximately the unexplored regions. Explanatory text is printed on the back, and by this arrangement each continent is dealt with on one sheet.

It must be remarked that no maps have been given for the Polar Regions or Australasia, without which this supplement cannot be considered complete.

Universal Atlas, The.—Complete in 28 parts, including index. Published by Cassell & Co., Limited, London, for the Atlas Publishing Company, Limited. Part XVIII. Price 1s. each part. [Presented by the Publishers.]

The present issue of this atlas contains a very good map of North-East Africa, and maps of South-East and South-West France. They are all well drawn, and the map of South-East Africa is worthy of special commendation.

PHOTOGRAPHS.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*Imèrina, the Central Province of Madagascar, and the Capital,
Antanànarivo.*

By the Rev. JAMES SIBREE.

Map, p. 816.

ALTHOUGH a great deal has been written about Madagascar generally during the last thirty years, since the island was re-opened to foreigners and to civilisation comparatively little has been made known about the capital of the country, where Europeans have had most influence, and where progress has been most marked. Since 1861, when the reign of terror under the Queen Ranavàlona I. came to an end, great advances have been made in our knowledge of the topography and physical geography of the island, and of its geology, botany, and natural history; much has also been ascertained as to its people, their divisions, language, customs, traditions, and folk-lore; and every year sees additions made to a fuller understanding both of Madagascar and of the Malagasy. Papers on the geography of the island, and describing various exploratory journeys, have either been read at the meetings of this Society, or have appeared in its 'Proceedings'; and we owe much to the late Rev. Dr. Mullens, the Rev. W. Deans Cowan, Mr. William Johnson, Captain S. P. Oliver, and others, for thus giving the results either of their own researches, or for summarising the journeys of other travellers.* Little, however, has been made known in this Society's publications as to the central province of Imèrina, the heart of Madagascar, the home of the dominant tribe, the Hova, and the centre of government; or about the capital city, Antanànarivo, where civilisation, education, and Christianity have made the greatest progress. I venture to think, therefore, that some description of the city, and of the province in which it is situated, will not be without interest to the members of the Royal Geographical Society, especially when illustrated by a number of

* I would remark here that I must not be understood as ignoring the valuable work of several French cartographers, as MM. Laillet and Suberbie, Péro Roblet, and especially M. Alfred Grandidier. In the above paragraph I am specially noticing the work of English labourers in the field of Madagascar geography.

photographs which have been recently taken, and which will be thrown upon the screen during the reading of this paper.

Before, however, describing Imérina and Antanànarivo, I will give a very brief summary of what has been done during the last twelve years to fill up the blanks on the map of the great island. In 1879 I contributed a paper to the 'Proceedings,' entitled, 'The History and Present Condition of our Geographical Knowledge of Madagascar,' in which I pointed out what had been done up to that date; and since then journeys have been made in various directions into regions either previously altogether unknown or only very superficially explored.

In the years 1877 and 1878 several journeys were made in the northern and north-western parts of the island, as well as from thence to the capital, by a German naturalist, Dr. Chr. Rutenberg. His researches added a good deal to botany and natural history, but not much to geography; although probably we should have learnt more on this point but for his murder by his treacherous native followers. It was not until 1880 that detailed accounts were published of his collections and discoveries.

A valuable addition was made in 1882 to our knowledge of the southern central provinces of Bétailéo, Bára, and Tanála, by a paper contributed to the 'Proceedings' by the Rev. W. D. Cowan, giving a very full map of those portions of Madagascar from personal survey. Mr. Cowan was a missionary of the London Missionary Society in the Bétailéo for several years, and utilised his numerous journeys for teaching and evangelising by doing useful geographical work, as well as by contributing to fuller knowledge of the natural history of the island.

During the progress of the Franco-Malagasy war, in 1884, an American naval officer, Lieut. Mason Shufeldt, made a journey from Môrondàva, on the west coast, to Antanànarivo, by a little-known route: and as he was well equipped with instruments for scientific purposes, it was hoped that some important additions would be made to our knowledge of the little-known region he traversed. I have, however, been unable as yet to obtain any account of Lieut. Shufeldt's travels, although, no doubt, full reports have been presented to the United States Government.

In 1886 my friend and brother missionary, the Rev. R. Baron, F.L.S., made a long journey to the north of Madagascar, passing from Antanànarivo through the Antsihànaka province northwards, and crossing to the north-west coast, by the districts called Andrôna and Béfandriana, to the Hova garrison town of Androntsànga. The most interesting discovery on this journey was the former existence of a large lake, running north and south for more than 200 miles, with a breadth of from 15 to 20 miles. Of this lake, the present lake of Alaotra, in Antsihànaka, about 25 miles long, is the small and still slowly diminishing

remnant. Mr. Baron says that he has traced indubitable proofs of the former height of the waters of this ancient lake at no less than 1140 feet above the present level of the Alaotra. Mr. Baron's journey enabled him to make important additions to our knowledge of the geology of Madagascar, which he communicated in a paper to the Geological Society during his subsequent furlough in England in 1889.

During the year following the journey just described, a part of Southern Madagascar, previously untraversed by Europeans, was crossed by a Norwegian Lutheran missionary, the Rev. J. Neilsen-Lund. Leaving his station in Bétailéo in July, 1887, Mr. Neilsen-Lund visited a part of the Bâra province, and also the district inhabited by the "emigrant Tanôsy," being for some time in no little peril from the unfriendly Bâra people. He then turned to the south-east, over mountainous and partly desert country, eventually reaching the Hova military post of Fort Dauphin, at the south-eastern corner of the island. Unfortunately, Mr. Neilsen-Lund seems to have had no instruments for mapping his route, so that his journey, although very interesting in some respects, has added very little to the map of Madagascar.

The same must be also said about two journeys made in 1888 by the Rev. E. O. MacMahon, of the Anglican mission, to the west of the island into the Sakalava country, to the district occupied by the Bétsiriry tribe. In this case also the traveller appears to have taken no appliances for making even a sketch-map of the region he crossed, until then unknown to Europeans.

In 1888 also the Antànambâlana River, flowing into Antongil Bay on the north-east, was surveyed by Mr. L. H. Ransome; and a full detailed map of its course, with descriptive paper, appeared in our 'Proceedings' for May of the following year.

A very fully equipped expedition, under instructions from the French Government, arrived in Madagascar in 1889, and, conducted by Messieurs Catat and Maistre, explored several portions of the eastern side of the island, and crossed the previously little-known and unmapped region of the extreme south. Excursions were first made in various directions from the capital, and then the old route from the Imérina plateau to Tamatave was explored; this proved to be extremely difficult to traverse, taking about three times as many days as the usual route. The principal journey was to the south, through the Bétailéo province into the Bâra country, and then into that of the "emigrant Tanôsy." The sources of the large River Onilahy were discovered, and important corrections made in the mapping of its course. The region to Fort Dauphin was crossed, and the fertile valley of Ambôlo visited; and the expedition returned to Bétailéo through the Antaisaka country. The botanical and natural history collections made by MM. Catat and Maistre are said to be extensive and valuable, as well as those relative to anthropology and ethnology.

Last year another long journey, covering more than a thousand miles of country, was made by Mr. Baron along the north-east and north-west coasts of Madagascar, as far as the extreme northerly point of the island. No detailed report of this journey has yet been published, but a full account will be given in the next issue of the 'Antananarivo Annual.' And as Mr. Baron is our chief authority not only on the botany of Madagascar but also on its geology, we may be sure that his latest travels will throw fresh light on the physical geography of the island, as well as on his more immediate fields of research, especially on petrology, to which he has been giving particular attention.

In concluding this brief sketch of the most important journeys made in Madagascar during the last twelve years, I may also mention the issue, by the eminent French traveller and scientist, M. Alfred Grandidier (of the Institute), of portions of the geographical section of his great work on Madagascar, in from twenty to thirty quarto volumes, still in progress. In 1879 he published an atlas of ancient and early maps of the island, including that of the Arabic geographer Edrisi (1153), the curious wall-map at Hereford Cathedral (circa 1300), and other quaint and interesting mediæval maps, down to those—often very erroneous ones, mere fancy sketches—put forth as "maps of Madagascar," up to as recent a date as thirty years ago. In 1885 M. Grandidier issued a volume of text, giving a detailed historical account of Madagascar map-making, as well as a minute list of the geographical features, place-names, &c., of the entire coast-line of the island. In 1880 he published a map of the Imérina province to a scale of 1:100,000; and in 1886 a map of the remarkable chain of lagoons on the east coast, extending for about 300 miles. M. Grandidier informs me that he is now putting the finishing touches to his atlas of Madagascar maps, in which he will give, to a large scale, the results of all his own explorations, and include all geographical data of any value supplied by other travellers up to the present time.

The eastern port of Tamatave, not far from the centre of that side of the island, is still, as it has been for more than 300 years, the usual place of landing for all those who are going to the central province of Imérina and to the capital of the country. Travelling is still in a rather primitive stage in Madagascar. There are no roads practicable for wheeled vehicles, and except a few bullock carts on the level grassy plains of the east coast, there is nothing in the way of carriage or waggon for the use of travellers. Europeans, therefore, as well as all well-to-do Malagasy, make use of the light palanquin or *flanjana*, carried on the shoulders of four stout bearers, who mostly belong to the tribes formerly conquered by the Hova. On long journeys a double set of men is usually taken with each palanquin, while bed and bedding, stores and clothing, and all other necessaries, must also be carried by other bearers.

Travelling is consequently tedious as well as expensive, but is not without enjoyment, especially during the fine and cool season of the year.

The road from Tamatave to Antanànarivo passes first for about 60 miles, or two days' journey, southward, along the coast, generally between the line of lagoons and the sea. This is one of the most pleasant, as well as the easiest portion of the route, for the path is perfectly level, along park-like expanses of greensward, dotted with clumps of trees and occasional patches of forest, with the lagoons on one side, often expanding into broad lakes of calm water, while on the other we have the expanse of the Indian Ocean, with the never-ceasing roar of the surf, driven by the south-east trades.

At Andôvorànto, canoes are hired for a half-day's voyage up the River Ihàroka and one of its tributaries. This is a pleasant change from the motion of the palanquin, and as we glide over the smooth stream, impelled by the paddles of the boatmen, we are enlivened and amused by the canoe songs of our men, in which there is often an improvised recitative, with a frequently-recurring well-known chorus, in which all join.

The palanquin has, however, soon to be resumed, and we begin to traverse hilly country. Here, for about a day's journey, we are in the region of the Traveller's-tree, the Bamboo, and the Rofia-palm, which fill every hollow, and by their peculiar and graceful forms give quite a special character to the scenery. We gradually get higher until, as we approach the outskirts of the forest-belt, we are about 1300 feet above the sea-level.

The comparatively easy travelling of the journey so far is now succeeded by three days' very hard work for our faithful bearers, as we cross the line of forest which extends like a green girdle round so large a portion of the coast regions of Madagascar. The path, a mere track formed by the bare feet of the passengers, goes up and down the hills at very steep gradients; and these ascents and descents are, after two or three days' rain, just slopes of adhesive slippery clay, up and down which our men toil heavily with their loads. In fine dry weather, however, this portion of the journey is very enjoyable, the vegetation is magnificent, and the many new forms of orchid, fern, and palm are a continual source of delight. The climbing plants which bind the whole forest together with cordage and ropes of all sizes, are also a striking feature, and these sometimes reveal their presence by covering many of the trees with a mantle of creamy yellow or pink flowers. The path, although apparently descending as often as it ascends, is really a gradual rising to a higher level, and by the time we get clear of the first and broadest line of forest, we have ascended the first great step upwards to the interior highland.

Half a day's journey over the Ankay plain, and then across the

Mangaro River, brings us to the foot of the second and steeper step of our road. Then comes the narrow belt of upper forest, very beautiful, but with as difficult a path through it as on any part of the route; and then at length we emerge on the bare moory hills of the upper region, and are in the province of Imèrina.

This central region of Madagascar is sometimes termed by the people themselves *ANKOVA*, that is, "the place of the Hova," the dominant tribe of the island, who, advancing from the east coast, drove out the aboriginal inhabitants, the *Vazimba*, and made it their home, probably many hundred years ago. It is, however, more usually called *IMÈRINA*, a name as to whose origin there have been many conjectures; the most likely of these appears to be that it is from a Malagasy root (*érina*), meaning "elevated," "prominent," "conspicuous." It is difficult to give the exact boundaries or extent of Imèrina, as Malagasy provinces are not defined as minutely as European States or English counties. On the east, it is tolerably well marked off by the line of upper forest; on the north and west it shades off imperceptibly into the No-man's-land or uninhabited region which there divides the Hova from other tribes; while on the south it ends at the southern slopes of the *Ankaratra* Mountains (including this central mountain mass), and the thinly peopled region which separates the Hova territory from that of the northern *Bétsileo*. Roughly speaking, Imèrina forms an irregular parallelogram, extending about 100 miles north and south, and about 70 miles from east to west, with an area of about 7000 square miles—in other words, it is considerably larger than the county of York.

Imèrina is a mountainous country, with but little level ground except on the western side of *Antananarivo*, where the dried-up bed of an extensive ancient lake forms the great rice-plain known as *Bétsimitatatra*. This is the granary of the capital, and doubtless accounts for its position, and for the comparatively dense population around it to the north, west, and south. But there are innumerable valleys where the slopes are terraced with rice-plots, like great green staircases, where the grain is first sown broadcast, and from which the young plants are taken up and transplanted in the larger fields along the banks of the rivers, and in the beds of small dried-up lakes of ancient date. There are numerous lofty hills, of which *Angavokely*, to the east, *Ambòhimangàra*, in the extreme west, *Iharanandriana*, to the south, *Milangàna*, *Ambòhimandà*, and *Andringitra*—more central, and *Ambòhipaniry* and *Vòhilèna* to the north, are the most prominent, all forming capital landmarks and points from which angles can be taken in filling up details of the map. Then on the south-west the whole province is dominated by the central mass of *Ankaratra*, the peaks of which form the highest points in the island, although they are a little under 9000 feet above the sea. Mr. Baron calls it "the wreck of a huge but ancient sub-aerial volcano." It covers an area of from 50 to 60

square miles, and its highest peaks, called Tsiàsakàfo, Tsiàfajàvona, and Ambòhimiràndrina, are visible for an immense distance, especially to the west. Imèrina is from 4000 to 4500 feet above the sea-level, so that although well within the tropics, it enjoys a pleasant temperate climate, made quite cool and bracing in the cooler season by the south-east trade winds, which come fresh and moist over the forest belt and the wooded eastern plains. The atmosphere is wonderfully pure and clear, so that hills many miles away stand out with a sharp and distinct outline that is very deceptive to those newly come from our more misty air and our grey English skies.

The general aspect of this region is bare, as it is destitute of wood, except in the hollows, although there are patches of primeval forest still left in the northern parts of the province. There is a great extent of moor-like hills, so that but for the brilliant sunshine and the generally clear skies, Imèrina would, like much of the other central portions of Madagascar, be somewhat dreary, especially as the grass gets brown and parched towards the middle of the dry season. To myself, however, the extensive prospects, the presence of high hills, the pure atmosphere, and the exhilarating air, always gave an indefinable charm to the landscape even of the Hova province. But it is towards sunset that Imèrina is seen in its most attractive aspect. As the sun sinks lower and lower, the hills, range beyond range, are coloured with the richest shades of purple, the sky flames with crimson and gold, the long lines of red clay walls which enclose the native compounds glow like streaks of vermilion on the purple as the sun begins to touch the horizon. There is a glory of colour over earth and sky which is truly wonderful, and has again and again filled me with intense delight.

The geological nature of the central region is shown by the numerous lofty points and masses of granite or gneiss rock which form the summits of all the hills just mentioned, and of innumerable others of less elevation, but still of considerable height. In many cases these take the form of enormous "bosses," or rounded hills of rock; in others they have the appearance of Titanic castles or forts; while others, again, might be taken, in certain aspects, to be stupendous cathedrals. Overlying the primary rocks there is an immense extent of what I must call, for want of a better word, clay, although it is not true clay, but appears to be decomposed granite. This is usually deep red in colour, from the large amount of iron oxide, although it is occasionally brown, and sometimes white, like China clay. Iron is abundant, and gold has recently been discovered in many places. Quartz in many varieties, quartzite, graphite, galena, copper, saltpetre, tourmaline, and some other minerals, are also found in Imèrina.

The two groups of ancient and extinct volcanoes which were so graphically described by the late Rev. Dr. Mullens in a paper before this Society in 1875, hardly come into any description of Imèrina proper,

as one of them is just outside its western boundary, and the other group is beyond the Ankàratra Mountains, to the south-west. There are, however, within the district some detached hills which appear to be old volcanic vents: and these, with occasional lava flows, as well as basaltic dykes in several places, give evidence of ancient subterranean forces, now shown only by slight earthquake shocks, and by hot springs in certain localities.

The water-parting of the whole island lies, it is now clearly seen, much nearer its eastern than its western side, so that all the largest rivers flow across Madagascar and fall into the Mozambique Channel. The head-waters of the two chief rivers of Imérina, the Ikôpa, and the Bêtsibôka, and of their numerous affluents, are therefore on the eastern side of the province. The Ikôpa, fed by the Sisaony, the Andromba, the Mamba, and other streams, flows through the fertile plain of Bêtsimitàtatra, going north-west, and is joined by the Bêtsibôka further north; the united streams, now known by the latter name, falling into the head of the Bay of Bembatôka. The province is thus well watered by numerous rivers, although the annual rainfall only averages about 53 inches at Antanànarivo.

The only lake of any size in Imérina is that of Itasy, on its extreme western limits; close to it, on the west, are numerous extinct craters; indeed, the lake itself has probably been formed by the sinking of the ground, consequent on the discharge of so much matter from these old volcanoes.

The name Imérina is used by the Malagasy in two senses: one, with a wider meaning, including the districts of Imàmo to the west, and Valàlafôty to the north-west, and including all the Hova people; and then it is also used more restrictedly for the part which is exclusive of these two divisions of the country. This narrower Imérina is divided into six sections, known as "Imérina-énin-tôko," and comprising Avàrandrâno, which includes the capital (to the north-east), Vakinankàratra (south-east), Mârovâtana (north-west), Ambôdirâno (south-west), Vônizôngo (further north-west), and Vakinankàratra (further south-west), which last division is named from the mountain mass which it includes, and which cuts it off from the others.

These divisions are largely tribal, and are used by the native government in arranging the different shares of military levies, taxation, and all the various unpaid and forced service due by the people to their sovereign.

There are no means of ascertaining with certainty the population of Imérina, as no census has ever been taken. But from calculations which have been made as to the number of villages and houses, and the average occupants of a house, it is believed that the population of the province is about 1,100,000. Antanànarivo, of which I shall speak more fully presently, is by far the largest town in Imérina or in Madagascar.

There is hardly any other town of great size, although there is a considerable number of large villages, and these are rather closely crowded together in some parts, especially to the north and north-west of the capital. Several of these places were formerly of greater relative importance, as they were the capitals of the many small states, or "kingdoms," into which Imèrina was anciently divided, before the supreme authority became centred in the chief of Antanànarivo. Of these former chief towns, the following are the most noteworthy:—Ambòhimànga, a place which still retains a nominal equality in royal speeches with Antanànarivo, a picturesque old town built on a lofty hill surrounded with woods, about 11 miles north of the modern capital; also Ambòhidratrimo, Ambòhidrabiby, Ilàfy, Alasôra, and some others. In former times, every royal speech mentioned *twelve* old towns or hills ("Ny Tàndrombòhitra rôa ambin' ny folo"), each of which had a semi-sacred character as being the seat of the ancient chiefs; the places just mentioned were included in these twelve, but others are now mere hamlets, if not as much deserted villages, as Old Sarum was in pre-Reform days in England.

All the ancient towns and villages in the interior of Madagascar were built on the top of hills, sometimes of considerable height. This was of course for security against enemies in the former warlike times, when every petty state was frequently fighting with its neighbours, like the barons of European castles in the mediæval period. Protection was further given by deep fosses dug out of the hard red clay, and surrounding the towns. These are frequently double, or even treble, one outside the other, and must have formed a very effectual defence in the days when firearms were unknown, and especially when helped by the earthen mounds often added inside the fosse from the material dug out. Some of these fosses look like a railway cutting through red sandstone, and although they are in many cases probably two or three hundred years old, the sides are generally as perpendicular and unbroken as when first excavated. A narrow bridge of the red earth leads to the gateway, which is formed of massive blocks of rock. Two different forms of gateway are found in these old towns: one kind is defended by a great circular slab of stone 10 or 12 feet in diameter, which, in time of war, was rolled between upright stones, so as to effectually block up the entrance. Another kind of gateway was formed by massive upright monoliths, between which heavy wooden gates were fixed. In many cases there is a treble gateway of this kind, with a narrow passage between each gate, so that the enemy could be speared from above, if the first or even the second line of defence had been broken through. Sometimes the passages are lined with a dense hedge of prickly pear, an impervious barrier to a bare-footed and almost naked soldiery. Many of these old towns are now deserted, the people building their villages at lower elevations, so as to have easier access to their rice-fields and daily work; but their

ancient defences form the chief antiquities of Madagascar, and are interesting memorials of a state of society now passed away in the central provinces.

The ancient graves of the Vazimba, the aboriginal inhabitants of the interior, are found scattered over the central province. These are shapeless heaps of stone, generally overshadowed by a *Fano* tree, a species of acacia, which has a semi-sacred character, its seeds being used in divination. Could these graves, like our ancient English barrows, be opened, doubtless much light would be thrown on the rather difficult question of the affinities of these Vazimba; but to meddle with any tomb, much more one of these ancient ones, is one of the most heinous offences among the Malagasy. A considerable number of upright stones, termed *Vatolihy* (lit. "male stones"), huge undressed blocks of granite, are also found on the hills and downs. These are memorials of former chieftains, or of battles of the old times.

As regards maps of Imérina, I believe that I was the first (in 1867) to make a sketch-map of the country round Antananarivo. This was, however, made chiefly to show the mission stations of the London Missionary Society. Parts of the province to the south-west were subsequently given much more fully by Mr. J. S. Sowell and Mr. W. Johnson; but the first detailed map of Imérina and the surrounding regions was published by the Rev. Dr. Mullens in 1875, as the result of a large number of observations taken by himself, and founded on positions fixed by Mr. James Cameron. A map to a much larger scale (1 : 200,000) was published by M. Grandidier in 1880; and he issued more recently (1883) a beautiful hypsometrical map of the province, showing by graduated tints the heights of every part of the country from the river beds to the summits of Antràtratra. "This," says M. Grandidier, "is, I believe, the first and only contour map which has been made of an uncivilised country on such a large scale. This map enables one to see at a glance the zones of altitude characteristic of this province, which is so mountainous and desolate beyond the great plain west of Antananarivo; and it shows clearly the manner in which the waters part themselves."

I now proceed to describe briefly the capital of Madagascar. Let me ask you to suppose that we have just come up from Tamatave, and by the route described a few minutes ago, have passed through the two belts of forest, and are now on the open breezy moorland of eastern Imérina. Antananarivo is still about 30 miles distant, a good day's journey from the upper line of forest. We see signs of a denser population as we advance: well-cultivated rice-fields in every valley, plantations on the hill-sides, numerous villages, and scattered homesteads, the houses being built of the hard red clay or decomposed granite, while the walls enclosing the compounds are also of this material. We pass the long mountain of Angavokely, with its double summit, one peak having a

remarkable resemblance to a mediæval castle; and then the rounded dome-like mass of Ambatovôry, with its woods—a remnant of the primeval forest—nestling in the valley at its base; and then a long gradual ascent brings us to a high moor, from which a very extensive prospect is unfolded; the greater part of Inèrina lies before us, and most of its prominent hills and its chief towns can be clearly seen. Before us, at 9 or 10 miles distance, is a long and lofty ridge, stretching north and south, on which buildings can be plainly discerned, cutting the sky-line; in the centre are the lofty white roofs of the group of royal palaces; to the north are the towers of the Prime Minister's house, its glass dome shining in the sunlight; while the spires and towers of churches can also be distinguished, especially at each extremity of the long line of hill. From this lofty point we descend into deep river valleys and ascend again several times before the two hours' ride still to be accomplished is completed; we lose sight of the city again and again, until another long ascent brings us up to the last hill before we descend into the valley which surrounds Antanànarivo; and at last, the capital of the island stands before us at a distance of three-quarters of a mile or so across the rice-fields.

It is certainly a very picturesquely situated town (more picturesque than convenient, perhaps); the rocky ridge, on the summit and slopes of which the houses are built, rises at its highest point, near the centre, to from 500 to 600 feet above the surrounding valleys and the western plain, and its length, north and south, is not far short of 2 miles. At the southern extremity it slopes down abruptly to the valley, but at the northern end the descent is more gradual. At about two-thirds of its length from the south, a large branch or spur of the hill separates from the main ridge and curves round to the north-west with a tolerably easy gradient; so that the actual extent of the city is not realised from the eastern side, and one must ride round to the west to see how large a place it really is. The ridge, though long, is narrow, so that there is little level ground on the summit; and the majority of the houses are built on terraces, cut away on one side, and built up with retaining walls on the other. At the junction of the two northern branches of the hill there is a large triangular open space called Andohàlo, where a market is held, and where great public assemblies are convened, as at the promulgation of any new law, or the reception of the sovereign on her return to her capital, &c.

East and west, the sides of the hill are very steep; indeed, on the western side they are precipitous. On this side is the precipice of Ampàmarinana, "the place of hurling," the Tarpeian of Antanànarivo, where those accused of sorcery were formerly killed by being hurled from the summit; and where also, in 1849, many Malagasy Christians suffered death, being supposed, by some powerful charm, to have been enabled to be disobedient to their heathen sovereign's will.

It need hardly be said that road-making is very difficult in a place like Antanànarivo. The naked rock comes to the surface almost everywhere; and the gradients, east and west at least, would be almost impossible for a carriage, even could the path be paved smooth. There are, in fact, only about two main roads in the city, one going north and south, and the other east and west. These are roughly paved in some parts; but it requires care even to ride on horseback along Antanànarivo streets. The houses are not built adjoining each other, as in European towns; each one stands in its own compound; although certainly in the centre of the city they are packed pretty closely together, and often the only path to large and respectable houses is by climbing low walls and struggling up and down narrow and steep rocky stairs.

Notwithstanding these drawbacks, Antanànarivo now possesses a large number of substantial and often handsome houses, as well as many public buildings which would not disgrace a European town. A great change has come about since I first knew the place in 1863. Then it was a town built entirely, within the city proper, of wood or rush and bamboo. By an old law, or rather custom, no building of stone or clay was allowed to be erected within these limits; and there was a similar custom in many of the other ancient towns. The houses of the nobles and the wealthier people were all of massive timber framing, fitted in with thick upright planking, and the roof of extremely high pitch, with long crossed gable-timbers or "horns." These houses were sometimes roofed with wooden shingles, but more frequently with thatch of a species of rush. It will be easily seen that with such combustible materials, fires were of frequent occurrence, especially at the end of the dry season; and twenty, thirty, or even a hundred houses were not unfrequently burnt down. The acceptance of Christianity by the Queen and Government in 1868 put an end to this foolish custom, as well as to many other still more harmful things; and the old timber houses have now almost disappeared from the city. An interesting relic of the past is still preserved with religious care in the palace yard among more modern buildings. This is the ancient royal house called *Bésákana*, where the corpse of a deceased sovereign lies in state, the building being draped entirely in scarlet cloth.

The introduction of sun-dried brick and tiles by Mr. James Cameron and Mr. W. Peel, of the London Missionary Society, as well as the erection of the stone Martyr Memorial Churches, of which I was the architect, has completely revolutionised the building art in Imèrina and in Betsiléo. And Antanànarivo, instead of being a town of wooden and rush houses, as I knew it twenty-nine years ago, has become a city containing hundreds of good two- and three-storied brick houses, with many public buildings of stone. Within the last ten years burnt brick has come into much more general use; and many substantial houses and some churches are now to be seen erected of this more durable material. Scores of houses

have their verandah pillars of moulded brick, or of stone with carved capitals. There are, it must be confessed, some drawbacks to the otherwise pleasant picture. There are too many houses unfinished, and a general aspect of disrepair visible, and a want of the neatness and tidiness so dear to a well-regulated English householder.

Among the prominent buildings of the capital are the group of royal palaces, the largest of which, an immense three-storied timber structure, has been surrounded with triple stone verandah and arches, and strengthened with corner towers. Then comes the immense stone and brick house of the Prime Minister, and other handsome residences of nobles and high officers, and the Greek-temple-like High Court of Justice, with its Ionic columns. Very prominent in Antananarivo also are buildings for religious and educational purposes; the four Memorial Churches of the London Missionary Society, each with spire or tower, together with about a score more (belonging to the same mission), less ornate in style, in the city and its suburbs; the Anglican Cathedral, although still wanting its towers and spires; the Roman Catholic Cathedral, with its elegant lantern-crowned towers; the Norwegian Lutheran Church; the College of the London Missionary Society and the High Schools of the same society, as well as those of the Friends, the Anglican, and the Jesuit missions; the Mission presses; the London Missionary Society's and Norwegian Hospitals and Dispensaries; while about two miles to the east is a French Observatory, superintended by a Jesuit priest.

It will be evident, therefore, that this capital of the Hova Malagasy is no mere collection of huts, nor is it like a Kaffir kraal, but is gradually becoming a respectable city; and I trust I shall not be treading on forbidden ground when I remind you that the advances in civilisation, enlightenment, and intelligence, which are so manifest in Antananarivo, and in also, in fair proportion, in other towns throughout the central provinces, are the direct results of the labour of Christian missionaries, chiefly those of the Society to which I have the honour to belong. The London Missionary Society, more than sixty years ago, sent to Madagascar artisan missionaries, as well as those whose work was more directly educational and religious; and to their united efforts the Malagasy chiefly owe the material progress they have already made, as well as the Christian teaching which has broken down the old idolatry of the people, which has covered the central provinces with hundreds of churches, which is teaching a hundred thousand children in its schools, and is raising up a formerly ignorant and semi-barbarous tribe to the position of an enlightened and Christian people.

The population of Antananarivo is difficult to estimate exactly. No census appears to have been taken by the native Government, but the houses have been counted by some of my friends, and careful inquiries made as to the average number of occupants. And from these it is believed by some that the population of the city is much over 100,000.

I should be inclined to put it at from 80,000 to 90,000. There is frequently a large number of strangers in the capital, as people come constantly from all parts of the island on Government business, bringing tribute, and receiving orders from the sovereign; and on special occasions, as when levies of troops are being made, &c., the ordinary population of the city must be swelled by many thousands. The name of the capital means, "at the town of a thousand," that is, probably, a thousand settlers or military colonists.

Many years ago, during the time of the early mission of the London Missionary Society, a plan of Antananarivo was made by Mr. Cameron (whose name has already been mentioned more than once in this paper), and was published in Ellis's 'History of Madagascar' (1838). The city has of course greatly increased since then; and within the last three or four years a new detailed plan to a large scale has been made from surveys by some French officers; but this has not yet been published.

Antananarivo may justly be considered the heart of Madagascar. There is the seat of government and of the most advanced civilisation of the country; from it go out the Hova officers and soldiers who garrison every port on the coast and every important town in the interior; from it go out weekly thousands of books and copies of the Sacred Scriptures; and there are trained the native doctors and surgeons and nurses, the schoolmasters and evangelists and teachers, who are sent to distant places to labour together with their European teachers in various ways to benefit their fellow-countrymen, and to hasten that day when, as we hope, the whole of Madagascar shall share in the advance and enlightenment which is already so marked in the central province of Imérina and in the capital city, Antananarivo.

The following discussion ensued after the reading of the paper:—

CANON TRISTRAM: I have never been in Madagascar; in fact, I have never been south of the Line; my travels have been confined entirely to the north; all I know is that the country has an extraordinary natural history. One would suppose, from its position, that this would have been African; but it, like its people, is thoroughly un-African; and it is one of the riddles of geographical distribution whence the peculiar types of Madagascar arrived. The monkeys and lemurs of Madagascar are not to be found in Africa, while all the great African animals of prey are absent. Among the lemurs is one known as the aycaye, the formation of whose digits is unique. The botany is almost as peculiar. We saw, at the last meeting of the Zoological Society, a specimen of the egg of an extinct bird of Madagascar which is fifteen times the bulk of an ostrich egg, and yet the bird itself does not appear to have been larger than, as far as we can judge from remains, the New Zealand moa, an extinct bird, to which it had an affinity. This same peculiarity runs through all the birds of Madagascar. Of course the water-birds and sea-fowl are the same as those of Africa, but there are one or two extraordinary exceptions. There is the snake-bird, a long-necked bird of very great beauty and grace, allied to the cormorant, which it resembles in its habits, and of which there are four species in the world—the Madagascar one is certainly Indian. Then, again, another puzzling bird to naturalists is the *Mesites*, a water-hen peculiar to Madagascar. These birds are usually

distinguished by a small tail and short tarsus, whereas the Madagascar, which is related to the others, has a long tail and tarsus; and no one until M. Audubert thought the bird was allied to the rails. There is a group of cuckoos entirely peculiar to Madagascar—the coua—of which there are nine or ten species, which have no relations at all in Africa or India. Then in another group we have a bird allied to the thrushes—but not African, although allied to a species in the Mauritius and all the Mascarene Islands—the *Hypsipetes*. Altogether we cannot explain the Madagascar fauna, but it shows that Madagascar must have been separated from Africa for an infinity of ages; and its natural history affinities are certainly rather with India than Africa, and yet they are entirely distinct and peculiar. No doubt there is a great deal more to be found out than we have yet obtained. The most peculiar specimens seem to come from the north-west part, which, I believe, has been but very slightly explored. We know less of it than of any other part, and that leads one to hope that we may still have further specimens, and that we may get something that will throw light generally on the Madagascar fauna, which is represented also in the Seychelles Islands, in the Rodrigues, and in Réunion, also in the Mauritius. A most interesting book of travels, written over two hundred years ago by a Huguenot exile, M. Leguat, who was banished to Rodrigues, has described a great number of the birds, which is now most interesting, as almost all the birds described are now entirely extinct. As the expedition fitted out to observe the transit of Venus happened to have one of its stations there, the Government attached one or two naturalists to it, who found in caves the bones and skeletons of something like eight to ten species, which are all described by M. Leguat. Speaking before so many naturalists more experienced than myself, I must apologise for the remarks I have made on the spur of the moment showing that zoologically Madagascar, quite as much as New Zealand, can claim to be a zoological sub-region.

Mr. PICKERSON: Mr. Sibree has given us such an exhaustive account of Madagascar, and especially of the central province of the island, that there is very little left to touch upon, even for one who has lived in the country a long time. I am very happy indeed to be able to endorse all that he has said. Generally, three inquiries are made about Madagascar. People want to know if life is worth living there, whether there is any good sport to be found, and what sort of trade is carried on. Well, Mr. Sibree has told us a great deal which tends to show that existence can be maintained for a considerable number of years with a fair amount of comfort. The inhabitants are exceedingly friendly, particularly the Hovas of the interior. Nowhere can people be found more easy to get on with; they are patient and they are civil. It is a very difficult thing indeed to put them out of temper, and they often get the better of Europeans through being able to maintain their equanimity so well. As a mark of the social progress which has been made in the country, it may interest you if I relate what happened to me just before I left. Looking at the pictures which have been exhibited this evening, you see a number of people who appear half savage; but it is quite remarkable to note the change that has taken place among the inhabitants of Antananarivo during the last ten or twenty years. A few days before leaving that place I was invited to a party given in my honour by a native who had similarly honoured me on my arrival eight years ago, and the difference between the two entertainments was very noteworthy. At the more recent gathering we were a company of over twenty Europeans, including several ladies, and there were seven or eight natives present, members of the host and hostess's family. We were received in a well-furnished drawing-room, a little gaudy, of course, but not much so, and the lady and gentleman, in evening dress, welcomed us with refined hospitality. After assembling, we were taken upstairs, and feasted royally at a dinner of some twelve or fourteen courses. Wines and

vians were all good, and after dinner the gentlemen were served with cigars and the usual *et-ceteras*. Then they were escorted to the drawing-room, whither the ladies had preceded them. The carpet had been removed, and we had dancing until two o'clock in the morning. That is not the sort of thing you would find everywhere in the island, but it will convince you that life in Madagascar is not all savage. With regard to sport, we have heard a little about the birds already. It is quite true that there is no big game. The only ferocious animals are the crocodiles, which exist in great abundance. You may see them piled up one on top of the other, like so many logs of wood. The rivers in some places near the coast are so much infested by them that it is dangerous to use the hand as a dipper in drinking. The natives bale out the water with a calabash fastened to a long rod. When they bathe, two go together, the one procuring the water and the other standing to be soured with it. There is not a great variety of game birds, but there is a great quantity. There are the whistling teal, the Muscovy duck, and guinea-fowl—the latter I once secured four with one barrel. There is also a beautiful little bird something like a sand-plover, which is capital sport. But the most important question seems to be, What is to be made out of the country? What is trade like? There is satisfaction in being able to tell you that, although it is not so good as it ought to be, or even as it might be with proper encouragement, about three-fourths of it is in British hands. With political security it would, I believe, rapidly develop. The island abounds in cattle, and there is no such thing as disease among them. They are of the humped species. In the neighbourhood of Antananarivo they fetch from £1 to £3 a head; but in other parts, where pasturage is good, they may be had for about 12s. A few years ago they were being shipped from the west coast at about 24s. a head, inclusive of all expenses, and sold in Mauritius and Réunion at from £3 to £6. The business, however, is a risky one, and it is not paying now as it used to do. The minerals of the country have been referred to by Mr. Sibree. Gold has been found throughout a wide extent of territory, chiefly in districts lying to the west, north-west, and south-west of the capital; but, up to the present time, no satisfactory mining has been done. The natives are working at the alluvial deposits, and the aggregate yield is of considerable moment. Most of it finds its way to Antananarivo, and is bought on the quiet by foreigners. Prospectors and practical miners who have visited the country are of opinion that it is very rich, and that some day it will rival South Africa. Some people have hinted at the existence of diamonds, but I should not like to be called upon to prove that any have been found. The most that can be vouched for in that direction is, that travellers from Kimberley have been struck with the appearance of certain parts of south-west Madagascar as resembling the actual diamond-fields. Anyhow, the island is one of immense possibilities, and it is not the worst place in the world to live in. Travelling, however, is both difficult and expensive. I had the curiosity to ask a gentleman who travelled in the same steamer with me how much it cost him to get from Antananarivo to Tamatave, and the answer was, £36. The journey referred to occupied a little over five days. Exploration, therefore, requires both a great amount of time and a great deal of money.

Sir RAWSON RAWSON: I would like to say a word or two. I have listened with unusual interest to the paper read this evening, for I was in Mauritius in the years from 1844–1854. I was there at the time that the massacre of the Malagasy Christians took place, and when one of the earlier missionaries—I believe the sole missionary at the time—was fortunate enough to escape from Madagascar and arrived safely in Mauritius. His name was Baker. He was a printer, and an exceedingly earnest, good man, and very intelligent, from whom I learned a great deal about Madagascar as it was, we will say in the year 1845—very nearly fifty years ago. It

was in the year 1816, I think, that the sailors of the *Conway* were massacred on shore and their heads stuck on poles at Tamatave. In fact, H.M.'s service did not gain much honour on that occasion from its contact with the Malagasy. What has struck me, in listening to this paper, is the great advance Antananarivo has made, and the total absence of improvement in the means of communication between Tamatave and the capital. As now described, it is exactly what it was fifty years ago, and apparently the French, who have now been in occupation long enough to have made travelling more easy, have failed to do so. It certainly is surprising. I rather suspect that the Malagasy up to the present time have not wished to improve the communication between the shore and the capital. I do not know if I am right, but Mr. Sibree will inform us. I wish also to bear witness to what Mr. Sibree has said with regard to the work of the London Missionary Society, and the other missionary societies in the island, towards the civilising of the natives. They deserve the highest credit for the perseverance, courage, and zeal with which they have prosecuted their labours. We may also add that here—as in many places we cannot do—their work has been highly successful. I have listened to the paper with the greatest pleasure, and shall be glad to be the mouthpiece of the audience in conveying our thanks to Mr. Sibree, not only for his paper, but for his most interesting and beautiful illustrations.

MR. SIBREE: In reply to the question, I may just say it is quite true no improvement at all has been made in the means of communication from Tamatave, and the cause of this has been largely political. The prime minister used to say he had two generals in his army, General Forest and General Fever, and these he pitted against any foreign forces coming up to take his town. The Malagasy discourage the road to the interior, because they know it would be used by foreign forces to enable them to overawe the town of Antananarivo; and the wisdom of this is proved, as the French, when they invaded the island, were only able to penetrate 5 miles inland from the coast.

THE PRESIDENT: Mr. Sibree, who has done already so very much to make Madagascar better known in Europe, has added to his services by the excellent paper he has read to us to-night. You will desire that I should return to him, in your name, your best thanks; and I do not doubt that you will wish to include the other gentlemen who have addressed us. Mr. Pickersgil told us a great deal that was very interesting, and with much skill he entirely avoided the subjects upon which Mr. Sibree had already addressed us. One is always safe in calling upon Canon Tristram whenever there is a question of natural history in any part of the world; and Sir Rawson Rawson is always instructive.

Mr. Conway's Karakoram Expedition.

THE following letter from Mr. Conway has been received by the Secretary. The previous letter, referred to in the first paragraph, as well as the maps which, in a former letter, were said to be about to be sent down in the Residency bag, have not as yet come to hand. The letter now received gives an account of the explorations carried on during the month of August on the Baltoro Glacier, in the Mustagh Rango. Mr. Conway's party reached Srinagar on October 12th, having been the whole summer

season—some five months—in the mountains. Some extracts from private letters from Mr. Conway's companion, the Hon. C. G. Bruce, a son of our late President, Lord Aberdare, are added. They supply in part the missing letter by giving an account of one of the great glacier passes crossed. Of the second, the Hispar, &c., crossed by Mr. Conway himself, we have as yet only the summary account telegraphed to the 'Times.'

JUNCTION CAMP, BALTORO GLACIER,
BALTISTAN, KASHMIR.

August 29th, 1892.

IN my former letter I sent you an account of the passage of the Nushik La and the Hispar Pass, accomplished by sections of my party. I have now to inform you of our doings during the last month. We remained at Askoley for four days, resting from our labours, and making preparations for an exploration of the great Baltoro Glacier. Mr. Eckenstein's health compelled him to quit the party, so that when, on July 31st, we started away from Askoley, our numbers were reduced to the Hon. C. G. Bruce, Mr. A. D. McCormick, and myself, with the Alpine guide, Zurbriggen, and our invaluable four sopoys, Harkbir, Amar Sing, Parbir, and Karbir, all from the 1st Batt. 5th Goorkhas. We had, besides, about seventy coolies, and a miscellaneous following of servants, goat and sheep drivers, and the like.

The first day we retraced our steps to the foot of the Biafo Glacier which we crossed in blazing mid-day heat to the usual camping-ground, called Korofon. The glacier has retreated considerably since Col. Godwin-Austen was here, and no longer blocks the main Braldu Valley. The river that drains the Baltoro and Punmar Glaciers flows past the foot of the Biafo Glacier, and does not tunnel under the ice. From Korofon we went forward in two parties to the rope-bridge that crosses the Punmar stream. One party kept the lower way round by the edge of the river. McCormick and I climbed over the intervening mountain buttress for the sake of the wider view, and also in order to add to the natural history collections. We found several flowers new to us, and caught a quantity of butterflies. We met our companions at the rope-bridge, and camped just beyond it. The coolies, carrying first their loads, and then the sheep and goats one by one, took five hours to cross the bridge. Close to our camp was a side stream draining a small glacier on the east. The stream is usually about two yards wide, but during the night of August 1st, owing to the great heat, it so waxed in volume that when we came to try and cross it our endeavours were for a long time fruitless. We set the coolies to cast stones into the deeper parts, but the waters carried them away as fast as they were thrown in. Zurbriggen then got out the climbing-rope, and McCormick and a Goorkha succeeded in wading across with it. With this rope fastened

from bank to bank, and the Goorkhas, and often Bruce, standing thigh-deep in the icy stream to help, we succeeded in conveying all the coolies over. The stream was steadily rising all the time, and the last coolies, when they did not fall down, were at least buried up to their waists in the swift torrent. Bruce was here, there, and everywhere, manifesting his usual abundance of energy. He carried over about half the sheep, taking them one by one under his right arm, while with the left he grasped the rope in the deeper places. At first he carried two sheep at a time, one under each arm, but the rising waters prevented any further exploits of the kind. An hour later we reached the angle of junction of the Punmar and Baltoro Valleys, and thenceforward we advanced up the latter towards the foot of the great glacier. It took us a day and a half of most laborious travelling to reach the foot of the ice. The whole way we traversed steep stony slopes bare of all vegetation and facing the south, whence the sun blazed down upon us with a hateful fury. Above us was almost always a precipitous rock-cliff; below us the raging torrent. We had to find an often precarious way across the narrow *débris* slope between the two. Sometimes we were forced to descend to the very verge of the waters; sometimes we had to scramble across the face of the precipitous rocks. At length, on the second day, the foot of the Baltoro Glacier came in sight, and in due time we pitched our camp close to the ice-cave from which the river rushes in mighty volume. We rested a day at this spot.

On August 5th we climbed on to the foot of the Baltoro Glacier, and commenced ascending it. Little did we foresee the discomforts it had in store for us. The Hispar Glacier, with its stone-covered snout 20 miles long or more, had been a revelation to us; but if the Hispar Glacier is stony, the Baltoro is much stonier. Fully two-thirds of its entire length are so completely covered with stone-*débris* that the ice is not visible, except where lakes or crevasses occur. We were able to avoid the lower part of the Hispar Glacier by traversing the slopes of its left bank; but the banks of the Baltoro are not traversable. Straight up the horrible middle of the ice one is forced to go. And then the surface is not flat, but consists of a series of prodigious mounds. One I measured was 200 feet high. These mounds can sometimes be circumvented, but oftencat must be climbed over; and the stones that drape them are resting upon ice, and constantly give way under the foot. There are also many lakes in the ice hereabouts, as in so many other glaciers, and these add to the deviousness of the way. It follows that the progress of the laden coolies was slow, and that the marches had to be short. To make matters worse, the weather was abominable, and every afternoon we were deluged with cold rain, which seemed to freeze the very marrow of our bones.

The scenery by which we were surrounded during these days of glacier marching was, of course, superb. On the very first day

Gusherbrum disclosed his giant tower right ahead of us, uncompromisingly inaccessible from this side. On the evening of the second day, after the usual storm, the veil of clouds, swiftly drawn aside, revealed to our delighted gaze the glorious form of Masherbrum, with his summit rocks golden in the sunlight and grand skirts of snow sweeping down to the glacier beneath.

Four days we marched up the stony glacier, and at the end of the fourth march we encamped by the side of a little lake on the north bank. The weather promised well for the morrow, and we determined to ascend a peak to the north, whence we might expect to gain a view of the monarch mountain of the district, the peak catalogued on the map as K², and measured 28,278 feet high, second therefore only, amongst measured peaks, to the great Gaurisankar, in Nepal. A peak so important cannot permanently remain with a designation so inadequate. It has been proposed to attach to it the name of that energetic explorer and surveyor, Colonel Godwin-Austen, just as the name of the Swiss surveyor Dufour has been attached to the highest point of Monte Rosa. But as no one would dream of calling the highest of the Central Ponnine Alps Mount Dufour, and as it is surely inappropriate to exchange the ancient and beautiful name of Gaurisankar for that of Mount Everest (euphonious though it be), so neither does it seem to me suitable to call the monarch of the Mustagh Range Mount Godwin-Austen. Let the highest point of Gaurisankar be the Everest Peak, the highest point of K² the Godwin-Austen Peak, as the highest point of Monte Rosa is the Dufour Peak; but let each great mountain mass be named, as the natives of a locality always name their mountains, descriptively, and not after any person whatsoever. Tower-like in form, K² stands on the great rampart that encircles and protects the empire of India on the north. It looks abroad over the Central Asian plateau. I suggest, therefore, that it be called the Watch-Tower of India, and by that name I shall designate it till a better be suggested.

At two o'clock in the morning of August 10th we started to ascend the mountain of our choice. It seemed to be a point in the ridge dividing the Baltoro Glacier from the tributary ice-stream that comes from the Watch-Tower. The brilliant moonlight enabled us to dispense with a lantern. We mounted at a fairly rapid pace straight up the slope of grass and stone-débris north of our camp. The dawn did not appear till long after it was expected; but the moonlight sufficed to make even such unpleasant ground as we had to travel over, visible in all its details. When we had climbed for about an hour, the view behind us was greatly developed. We could look up the various side glaciers to the south and discover the order and arrangement of the peaks at their heads; but it was not these that startled our interest, and made us halt thus in the cold morning. A far more important object was in sight away to the south-east, at a distance of some 15 miles.

The Baltoro Glacier is formed by the union at the west foot of Gusherbrum of two great affluents. One of these descends from the Watch-Tower, and is itself formed by the confluence of seven tributaries; the other and longer branch comes in from the south-east. About 8 miles above the junction point this south-east glacier again divides into two large branches. Between these rises an enormous mountain mass, not marked on any map. It is throne-like in form, and, as it were, draped in a noble white robe. Auriferous veins permeate its mass. We named it, therefore, the Golden Throne. It was this beautiful mountain, with one exception the most beautiful in this region, that had been coming into view as we ascended, and now, in the mixed lights of moon and dawn, smote upon our eyes as we turned round. With one consent we cried, "That is the peak for us! We will go that way and no other!"

One of the chief objects of our day's expedition was thus early accomplished, for we had come forth to see the great peaks and make our choice from amongst their virgin array; and now, though we had seen but one, we were captive to its beauties, and our choice was made. We sat down for half an hour to fix the lineaments of the great peak once for all in our memory, fearing lest the envious clouds which enveloped Gusherbrum and Masherbrum should hasten to wrap away the Golden Throne from our sight. But in this matter, as in many others, the fates were generous to us that day; and though at times the sky was heavily beclouded, and the great mountains were for the most part buried in misty folds, the peak of our desires remained almost always visible from side to side and from base to summit.

When we started off again we went forward in happy frame of mind, pounding up the stones which no longer seemed so hateful. At break of day we halted to photograph the Golden Throne, and shortly afterwards we reached firm rocks, which led us to a finely-situated plateau, apparently intended by nature for a plane-table station, and promptly utilised by us as such. Above this plateau the ridge narrowed to a sharp rock arête, which we followed for the remaining four hours of our ascent. It is an arête broken by many gaps, and decorated with many points, shoulders, and teeth. It consists almost entirely of one kind of rock, whose strata, inclined but little from the vertical, cut approximately at right angles to the direction of the ridge. It results from this formation that there are frequent walls of rock across the ridge, whose steep faces have to be climbed. Sometimes we scrambled along knife-edges of rock; sometimes we went over the very top of jutting pinnacles; sometimes we had to take to the steep face on one side or other of the ridge, and to clamber along little ledges till we could get into a gully and climb back by it to the arête again, having thus evaded a difficulty presented by the crest of the ridge itself. Below us, on the left, at the foot of a precipitous rock-ribbed slope, was a narrow glacier,

broken from side to side by deep and impassable crevasses. Below us on the right, was another glacier, at the foot of a slope less steep, but still steep enough for a stone loosened by our feet to bound down it, taking an avalanche of its fellows with it to the icy plain.

All the Goorkhas went well. Harkbir shows the best mountaineering ability. Besides climbing as well as the others, he picks up the mountain craft more rapidly, and begins to handle rope and axe intelligently. He is already at least as good as a good Swiss porter, and if he could work for three years under a first-rate guide like Zurbriggen, he would become a good guide himself. Karbir could also be made into a good guide in the same time, and Amar Sing is only a little less promising than these two. Parbir is a capital independent scrambler, but will always remain an amateur.

We halted for an hour at the breakfast place, enjoying and photographing the gorgeous view that was displayed all around. Bruce and the Goorkhas followed our example and put on the rope: Parbir, the humorist of the party, amusing himself by roping Amar Sing in a slip-knot, and almost rolling over a precipice in shrieks of laughter. The sun was shining brightly on the eastward face of the arête, but the other side remained in frosty shade, and the delicate spicule of ice, with which the rocks were furred, kept crisp till the sunlight actually struck upon them and dried them away almost in a moment. We had already reached a height of over 17,000 feet, and yet we felt no inconvenience from the rarity of the air as long as we advanced at a steady pace, and were not obliged to take up specially cramped positions nor to hold the breath. If the chest is kept free, so that it may expand to its utmost limits, the lungs supply themselves with air enough. But if the man in front of you tugs at the rope and thus constricts the chest, or if, at the moment of making an unusual effort, you hold your breath, as you naturally will, a slight sensation of giddiness supervenes; but this is swiftly dissipated by a few deep breaths.

A quarter before noon we stood on the summit of our mountain, and as we found some crystals there, we at once named it Crystal Peak. Its altitude is approximately 20,000 feet. We were disappointed to find that it was not situated on the crest of the ridge dividing the Watch-Tower and Baltoro Glaciers, but that a deep gap separated us from that ridge. We could look over it at many points, but a narrow pyramid of rock about 1500 feet above us exactly shut out the view of the Watch-Tower of India, whose buttresses only were we able to see.

Facing the south the view was in many respects similar to that from the Zermatt Gerner Grat, though, of course, on a vastly larger scale. The Baltoro took the place of the Gerner Glacier, sweeping down from left to right, and fed by a series of large affluents descending from giant peaks. The Golden Throne occupied the position, and though far surpassing it in beauty, mimicked the form of Monte Rosa. Masherbrum,

imposing and precipitous, took the place of the Matterhorn. Its summit is certainly accessible, but the climber who reaches it will have to carry his life in his hand during all the climbing hours of a long summer's day. Beyond Masherbrum were countless minor peaks away to the stately Mango Gusor and the ridge opposite Askoley; but clouds rested upon them, and shut out any glimpse into the greater distances, which this, the only gap in the vast amphitheatre that surrounded us, might have permitted.

We remained for an hour and a quarter on the summit in perfect comfort, observing the instruments, taking photographs, eating our light luncheon, smoking our pipes, and by no disagreeable sensation whatever (as long as we remained quiet) feeling that we were a foot above sea-level. At one o'clock we reluctantly turned to descend. We retraced our steps for a few yards along the deeply corniced snow-ridge, and then, creeping through a gap in it, we struck straight down a snow-crested rib on the east. It was a steep rib, and the snow was rather soft; besides that, it rested upon ice, which now and again came too near the surface to be comfortable. But there were always rocks close at hand to which we could take if need arose, so that we advanced without anxiety. We followed the rib for an hour and a quarter and then left it for the couloir on the north, by which we reached the snow-field at the head of the glacier below in half an hour more. We ran down easy slopes for a few minutes, and thus came to the edge of the stone-covered portion of the ice. The remainder of our descent to camp took three-quarters of an hour, and lay wholly over slopes of horrible stone-*débris*. It was a glorious climb, and, for the matter of that, not unmemorable, for no peak of such altitude, in which there was any considerable mountaineering difficulty, has ever before been ascended. The climbing on the Crystal Peak, in the ascent at any rate, was as hard as the climbing on the Matterhorn.

The next day, August 11th, was brilliantly cloudless, filling all our hearts with content and our spirits with hope. We rested in the morning, and, after lunch, made a short march to the foot of the last considerable side glacier descending from the great ridge of which the Crystal Peak is a buttress. We made our camp on the fan of white moraine thrown off from the snout of the side glacier. Next morning, August 12th, Bruce and Zurbiggen went off to institute preliminary investigations in the neighbourhood of the Golden Throne, whilst McCormick and I, with two Goorkhas, made a second attack upon the ridge that hid the Watch-Tower of India from our anxiously expectant eyes. This time we proposed to reach a col in it instead of a peak. Starting at 6.30 A.M. we mounted the long slope of white *débris* behind the camp, and then traversed the steep slopes along the left bank of the White Fan Glacier. We thus avoided all the great crevasses, and reached the upper snow-field in two hours from our camp, and

just as the sun peeped over the high eastern ridge. We put on the rope and wandered across the snow-field, found a way over the big bergschrund beyond it, and then cut steps up a short, steep slope of ice to the col. It was an exciting moment before we topped the ridge, for, thanks to the map, we had a clear idea of what we expected to see. Below us should have been a vast amphitheatre of snow, and rising beyond it the Watch-Tower of India, visible from base to summit. Ever since I decided to come to these regions this was the view that had haunted my imagination and raised my keenest hopes. Now the long-expected moment was at hand, and only a frail wall of snow separated us from the wondrous sight. With a bound we were on the ridge, and floods of disappointment poured over us. There was no great snow-basin, no vast peak majestically rising out of it. Opposite to us was a mean ridge not much higher than we were (18,000 feet), and separated from us by a narrow glacier. Above the ridge there rose into the air an ugly mass of rock, without nobility of form or grandeur of visible mass, broken up into a number of little precipices by small patches of snow that spotted it about. McCormick, with his bag of blocks and colours, asked in disgust, "What have I brought these here for?" and we sat ourselves down in comfortless positions on angular rocks and lit our pipes for solace. However, matters were not really so bad as they seemed. The view to the north was a fraud, and the only thing to do was to turn one's back on it; but the view southwards, whence we had come, was superb. It was a mountain prospect, perfect in all respects, and beheld under every advantage of brilliant light, fallen obliquely enough, and absolute atmospheric clearness. For foreground there was the purest of snow-fields, bending to its hollow with every grace of curve. For frame there were the delicately-coloured walls of two mighty mountains, whose sharp summits pierced the sky on either hand to an overpowering height. Beyond the white snow-field was the sweeping surface of the Baltoro Glacier, acting as broad foundation for an infinite complex of mountains behind. Right and left, Jakin and Boaz to this temple of nature, two spires of dark rock reared themselves aloft, with a glacier flowing out between them from a low pass. Over this pass there came ridge behind ridge, peak behind peak, rising higher and higher, tier above tier, with ribs of rock and crests of snow and deep-lying valleys of ice-bound splendour, till the eye, bewildered by so much magnificence, ceased from the attempt to unravel the tangle of the hills, and rested satisfied with the whole as an impression, single and complete.

In returning to camp we could not follow the left bank, as in the ascent, for now the slopes were awake, and stones kept constantly falling down them, singly and in battalions. We had therefore to find our way through a maze of crevasses, which occupied a good deal of time. When we reached the tents we found the thermometer

within registering 92° , but by admitting what little breeze there was and loading the roof with blankets we made the place habitable. Later in the afternoon fine gossamer clouds began to drift up from the south-west—certain harbingers of bad weather in these parts. Presently they lost their crisp outlines and melted together into a high mist, which ultimately thickened into a black and threatening pall of cloud that blotted out all the blue from the sky, but cast it on to the mountain shadows.

On the following day, August 13th, we started up the glacier in the footsteps of Bruce and Zurbriggen, to join them, two marches on, at the base of the Golden Throne. In a little more than an hour and a quarter of quick walking we came opposite the mouth of the Watch-Tower Glacier, and could look towards the great peak; but its upper parts were veiled in clouds, and we could only see the spreading base of its buttresses. Opposite the Watch-Tower Glacier another great tributary comes in from the south, whilst the main Baltoro stream comes from the south-east and goes away to the west. We were therefore in a place similar in mountain arrangement to the crossing in the upper part of the Aletsch Glacier, which is known as the Place de la Concorde. We continued our march as long as the coolies could follow, and then we encamped at the entrance of the upper portion of the Baltoro Glacier, and in full view of the Watch-Tower of India whenever the curtain of clouds should be withdrawn.

Bad weather now set steadily in, and for four days we did not move camp. I would not advance further up the glacier till I had taken a round of angles with the theodolite from this important position, and photographed the Watch-Tower. Moreover, there were many necessary arrangements to be made. We were going beyond the limits of the scantiest brushwood, and required provision of fuel for a fortnight. The coolies and Goorkhas had to cook their bread for the same period. All this involved delay, and the fact that it snowed and hailed and blew continually did not facilitate matters. At last, on August 18th, the baggage arrangements and the weather permitted us to start upwards once more. We made a long march of it, still following the same moraine on which Junction Camp was pitched. Thick fresh snow lay everywhere, and made the going laborious; but in mid-afternoon we reached the camping-ground of our companions, and set up our tent alongside of theirs, at the very foot of the Golden Throne, and just out of reach of the avalanches with which it saluted our coming. The height of this camp (we called it Footstool Camp) was about 16,500 feet, or rather more. Its position was magnificent, at the foot of the splendidly coloured precipices of the Golden Throne, with a peak of over 25,000 feet on either hand, and various glaciers radiating from it in all directions. The glacier that most concerned us was the one that we were to follow in a south-east direction under the south-west side of the

Golden Throne. This mounted from Footstool Camp in a staircase of seracs, or ice-falls, above which we hoped to find a broad plateau and a snow-ridge leading from it to the peak.

During our absence Bruce and Zurbriggen had been working at the ice-fall, and had found a way up about 1000 feet of it; but there still remained a band of seracs through which they had not been able to pass. On the 19th they went up again with the Goorkhas, carrying a store of provisions which they deposited at the highest point they had yet been able to reach. The 20th was a day of rest, and brilliantly fine. On the 21st the dawn broke lurid and threatening. An ominous orange glow rested on the higher peaks, and illumined the wild clouds that curled about them. A horizontal drift of mist at a high altitude cut off the summits of the loftiest mountains, and cast dark shadows about their bases. The wind again blew from the south (the bad quarter), and the night had been too warm.

With so much to discourage us we nevertheless started on our momentous expedition shortly after six in the morning. We followed the well-trodden track to the foot of the seracs, and zigzag up amongst them. The morning was close and we all experienced some difficulty in breathing. In an hour and a half we came to the cache of provisions, above which the difficult seracs began. The fresh snow was in good condition at last, so that the work before us was not at all so hard as a few days earlier it would have been. We fortunately struck a good bridge over the worst chasm, and thanks to Zurbriggen's splendid leading, we ultimately emerged from the chaos of broken ice on to a sloping plateau of fairly even snow-field, divided about by a labyrinth of huge crevasses. Here we were forced to camp, as the snow was become too soft to permit heavily-laden men to venture over the many snow bridges that still had to be crossed. The height of Serac Camp was about 18,000 feet. When the tents were set up Zurbriggen and the Goorkhas went back through the seracs and fetched up the provisions from their place below. On the 22nd Bruce and the Goorkhas went down to Footstool Camp for more provisions. We were obliged to be well victualled, as, in case of bad weather coming on, it would not have been possible for us to get down through the seracs. Zurbriggen and McCormick went forward to find the way through the still difficult glacier, and I occupied myself about the instruments.

The cold was very severe on the morning of the 23rd, so that we delayed our start till 6.30 A.M., and then went off with such loads as we could carry, the tent, instruments, and warm wraps receiving the preference. The weather was magnificent, and only a few light clouds drifted over the neighbourhood of the Mustagh Pass, which never seems able to keep clear for many hours together. The trudge over the frozen snow was delightful except for our feet, which felt the cold severely. We were not discomforted by the altitude, and could have marched for

hours (in the shade) with pleasure. Our business was to force up the camp another 1000 feet on to the lower plateau, at the foot of what we supposed to be the Golden Throne's arête.

A series of long snow bridges had to be crossed and two journeys made before the sun softened them. When we reached the plateau, in less than an hour, Zurbriggen and the Goorkhas went back for the rest of the things, whilst McCormick and I set up and arranged the tent. When this was finished we discovered that our feet were dead. We pulled off boots and stockings and fell to rubbing our toes with snow. In about half an hour sensation slowly and painfully returned. The second journey occupied Zurbriggen and the Goorkhas about twice as long as the first, for the sun shone upon them, and made breathing difficult. They were presently followed by Bruce conveying some laden coolies, whose arrival made our preparations complete as far as food and camp were concerned. When the coolies had gone down, taking the unwilling dog with them, we set up the three tents for our four selves and three Goorkhas, and passed the remainder of the day in cooking and the like occupations.

On the 24th both Bruce and Harkbir were unwell, so leaving them at the lower plateau we carried all of the tents and three days' provisions another 1000 feet up to a level snow place at the actual foot of a steep slope leading to the arête we meant to climb. This again involved two journeys, and for laden men was very hard work. The height of Upper Plateau Camp was about 20,000 feet, and here Zurbriggen, McCormick, and I spent two nights. The Goorkhas went down to their tent by Bruce's on the lower plateau.

At length, on the 25th of August, we assaulted our peak. Bruce and the Goorkhas called us at 1.30 A.M., and all seven of us had to crowd into the one tent till it should be time to start. They were all fairly numbed when they arrived, and we now know by experience that, at this altitude, none of us could stand the cold of night for more than an hour. Hence we did not start till 7 A.M. A series of sleepless nights, culminating in this last, rendered McCormick unable to march, so we had regretfully to leave him behind. We started straight up the snow slope behind the tent, and in an hour reached the arête, along which the remainder of our route was to lie. Our bodies grew warm with exercise, but the cold ground seemed to suck the warmth out of our feet. They gradually lost all sensation, notwithstanding our stamping and crunching of them. At last we had to halt and pull off our boots, and set to work rubbing to save ourselves from frost-bite. This we only just succeeded in accomplishing. The sun now came upon us, and though our feet remained numbed for the rest of the day, and in the case of some of us for several days, our bodies were soon far too hot to be comfortable. The great variations between biting cold and grilling heat are the chief impediment to mountaineering at high altitudes in

these parts. Not only are the cold and the heat alike hard to endure, but the change from the one to the other seems to weaken the forces and to render the whole body feeble.

A quarter of an hour's walk brought us to the first point on the ridge, about 1300 feet above camp. Here we halted to set up the barometer, and take some photographs. Beyond the first point there was a small depression, which had to be reached by a rather difficult rock scramble. On either hand steep slopes, or walls of ice, descended to the glaciers below, and we were obliged to keep to the very crest of the narrow ridge. Here our climbing-irons were of the greatest assistance, for the rocks were all fissured over with little cracks, which would have given no hold for bootnails, but afforded securest anchorage for the steel points of our claws. Beyond the little col, which we reached in about ten minutes, the slope on our right hand came rounding forwards, and presented to us a very steep face of mingled ice and rocks, which had to be surmounted before we could again travel along the main arête. We had a tough scramble of it for a quarter of an hour, and then we expected better things. But, to our horror, we found that the ridge leading to the second peak was not of snow, but of hard blue ice covered with a thin layer of snow. Every step we took had to be cut through the snow into the ice. The snow would have clogged the climbing-irons and prevented them from taking firm hold of the ice had it not been cleared away.

The ice beneath was in any case too hard for the steel points to penetrate until it had been prepared by a stroke or two of the axe. Small steps sufficed for us, but if we had been without climbing-irons, large ones would have been necessary for safety; our work would have been greatly increased, and our rate of progress much diminished. As it was, Zurbriggen found the work of step-cutting—severe at any time—far more fatiguing than at the ordinary Swiss levels.

From the top of our rock scramble to the second peak took us an hour and ten minutes. We were rewarded when we got there by finding, under a kindly rock, a little pool of clear water, more precious to us than all the veins of ore that traverse our mountain in every direction. Amar Sing was overtaken by mountain sickness at this point, and had to be left behind.

The remainder of our ascent was altogether monotonous. The white ridge led straight up before us, and had to be followed. It was of ice thinly covered with snow, and every step had to be cut with the axe. Moreover, the arête was heavily corniced on our left hand, so that we were forced to keep well on to the right slope, and remained in ignorance of the development of the view in the other direction. Our advance was necessarily slow, and the terrible heat which the burning rays of the sun poured upon our heads did not add to its rapidity. There was plenty of air upon the corniced ridge where we could not go,

and now and again a puff would come down upon us and quicken us into a little life. For the most part we were in the midst of utter aerial stagnation, which made existence intolerable. Such conditions dull the observing faculties. I heard the click-click of Zurbriggen's axe making the long striding steps, and mechanically struggled from one to another. I was dimly conscious of the vast depth below on the right filled with tortured glacier and gaping schruns. But now and again would come a reaction, and the grandeur of the scenery would make itself felt. We could look over the three passes at the head of the serac glacier, and behold mountain masses of extraordinary grandeur showing above them. At length the slope we were climbing became less steep, and with a few more steps we stood, at 2.45 P.M., on the summit of the third peak on the ridge, at an altitude of about 23,000 feet.

Here a surprise awaited us. The Golden Throne's summit was still 1300 feet above us, but the peak we were on was absolutely cut off from it by a deep depression, of whose existence we had necessarily been kept in ignorance till now. We had climbed another mountain, and our work was done. We were glad of it. I imagine that when my observations are properly reduced the altitude of our mountain will come out from 22,750 to 23,000 feet. We named it Pioneer Peak. Unfortunately, the broad extended arms of the Golden Throne shut out much of the distant panorama from us on one side, and a grand snow pyramid of over 25,000 feet on the other also intercepted the view to the south, though its own noble aspect was compensation enough. But framed in the passes I have mentioned there were glorious mountain pictures, that to the south, looking straight down the great Kondus Valley, and away over the bewildering intricacy of the lower Ladak Ranges, being especially fine, and rendered all the more solemn by the still roof of cloud poised above it at a height of about 25,000 feet. When one beholds a small portion of nature near at hand, the action of avalanches, rivers, and winds seems tremendous; but in a deep extending view over range after range of mountains, valley beyond valley, nature's forces are reduced to a more trembling insignificance, and the whole effect is of a majestic repose. The clouds seemed stationary above the mountain kingdom. Not a sound broke the utter stillness of the air. We ceased to pant for breath the moment the need for exertion was withdrawn and the breeze began to play upon us. A delicious lassitude and forgetfulness of past labour supervened upon our overwrought frames.

But the moments were precious, and each must be used to the best advantage. The sickness of two of the Goorkhas reduced the number of instruments that could be carried, and I greatly lamented the absence of my little theodolite, whose place was inefficiently supplied by a prismatic compass and a clinometer. With these I took a round of angles. I next photographed the panorama twice round. Then the

turn of the plane-table came, and I was able to sketch in an important addition to the glacier survey. Meantime the barometer had been accommodating its temperature to that of the surrounding air (54 Fahr.). It stood at 18.30 inches, and yet we felt no insufficiency in the supply of oxygen, and Zurbriggen was able to smoke his cigar in comfort. Finally I took tracings with the sphygmograph of Zurbriggen's pulse and mine; and here the damaging effect of altitude made itself apparent. Our lungs were working well enough, but our hearts were being sorely tried, and mine was in a particularly bad state. We had all nearly reached the limit of our powers. We could have walked uphill 1000 feet more or so, but we could have done no more difficult climbing, and Zurbriggen said that he could have cut no more steps. If we could have had tents and warm wraps and spent the night at this point, we should, I believe, have been able to restore our forces and to have climbed another 3000 feet next day; but we were all weakened, not so much by the work of the previous hours as by the continued strain of the last three weeks. There was no debate about what we should do next: we all knew that the greatest we were going to accomplish was now done, and that henceforward nothing remained for us but downwards and homewards.

We remained on the top for an hour and a quarter, for it was hard to give over repose, and harder still to tear ourselves away from a scene so magnificent and so rare. The southward vistas, which were wholly new to us, had of course chiefly arrested our attention in the moment of our arrival at the top; but it was westwards, down the valley we had mounted, and far far away to the north-west, that the vastest area was displayed to our wondering gaze. Gusherbrum, the Broad Peak, and the Watch-Tower of India showed their clouded heads over the north ridge of the Throne, and were by no means striking objects. Further round we looked straight down the Baltoro Glacier to the great Junction, beyond which stood up, in all its constant majesty, the finest mountain of this district and of all mountains that I know, save only the unsurpassable Matterhorn, for majesty of form. It is a peak about 25,000 feet in height, unmarked on any map, and if previously beheld by any traveller, mistaken, as is most likely, for the Watch-Tower of India. It stands close to and east of Captain Younghusband's Mustagh Pass, so I have called it the Guardian of the Mustagh. Beyond this and the neighbouring Mustagh peaks came the Biafo mountains, and those that surround the Punmar Glacier, and this was but the foreground of the view. Away it stretched to the infinite distance behind the ranges of Hunza, and northwards, possibly as far as the remote Pamirs. This incomparable view was before us during all our descent, with the evening lights waxing in brilliancy upon it, and the veil of air growing warmer over it. The high clouds that roofed it became golden as the sun went down, and every grade of pearly mystery, changing

from moment to moment, onwrapped the marshalled mountain ranges that form the piled centre of Asia, and send their waters to the remotest seas.

A few minutes before four o'clock we started on our downward way, and in little more than half an hour we reached the rocks of the second peak, and were able to satisfy our thirst with draughts of fresh water from a generous pool. We found Amar Sing quite well again, and able to make the descent without assistance. It took us 50 minutes to reach the first peak, and then our work was practically finished, for only a long snow slope separated us from the tent. After a final look round, we seated ourselves on the steep snow and slid down it to camp in less than a quarter of an hour. We reached camp at a quarter past six.

Next morning, August 26th, we went down to Bruce's camp at an early hour, taking all we could carry with us, and leaving the rest to be fetched by two Goorkhas. We loitered about on the lower plateau, so that it was eleven o'clock and very hot before we started down through the seracs. We found the snow soft and many of the bridges broken, and besides, we were all heavily burdened as well as tired. The heat was terrible, and not a breath stirred the stifling air. The four hours or more that we spent amongst the seracs were far the most trying we have experienced. Ultimately we reached Footstool Camp and entered upon repose. We rested there the following day, and observed, without regret, that the fine weather was breaking up. On the 28th we came down to Junction Camp, starting rather late, and being overtaken by a snowstorm and driving wind on the way. Snow fell heavily all the afternoon and during most of the night, and when we awoke next morning the snow had drifted up the sides of the tents to the height of a foot or more. The sun is now shining hotly, and wreaths of cloud are drifting around the Watch-Tower of India and the Golden Throne. We shall continue our downward march this afternoon whatever the weather may be, for we are tired and worn by long exposure to high altitudes. Our stock of provisions is running short, and our flock is reduced to one miserable little sheep. To-morrow we hope to reach the foot of the Masherbrum side glacier, whence a low pass leads southwards to Kapalu. We hope to cross that, and thus to leave the regions of glaciers and snow. I intend to go to Leh to compare my barometer with the standard instrument there, and then to return to Abbottabad and so home.

W. M. CONWAY.

SKAHOO, September 12th.

P.S.—I have had to be the carrier of my own letter, so I reopen it to inform you of the close of our mountaineering season. Bad weather pursued us down the Baltoro Glacier, and we were daily snowed and hailed upon. On August 31st we arrived at the corner of the Stachi-

kyungme eido glacier (just opposite to the highest point reached by Col. Godwin-Austen). Next day we sent off all our spare baggage and rested. On September 2nd I sent Zarbriggen to look at the reputed pass at the head of the side glacier by which we hoped to cross into the Husho Valley. He returned with the report that the passage was impossible, the glacier being terminated by a lofty wall entirely swept by ice-avalanches from high-perched overhanging glaciers. There was nothing for it but to go down by the way we had come; and anyhow, the continued bad weather made this course the only prudent one. We reached Askoley in three forced marches, and rested a day there. On September 7th and 8th we crossed the Skorola to the village of Skoro, in the fertile Shigar Valley, and we came on here, down the Shigar and across the Indus, on a raft of inflated sheepskins. To-morrow we start for Leh.

W. M. C.

The following are the extracts from the letters of Mr. Bruce:—

NAGAR, June 25th, 1892.

NAGAR is about six miles from Balbit—Hunza Proper, that is—and is almost as delightful as that place.

The cultivation of both places is simply extraordinary, and the system of irrigation perfect. Conway considers that some of the main irrigation canals must be five hundred or six hundred years old. Every field produces two crops a year, and has for many generations; and, as far as I can see, the land has apparently no need of rest. I suppose plenty of sunshine and water, with certain snow in winter, has a good deal to say to this. Hunza and Nagar have great forts like a Norman castle, with the village grouped all round them, so that the people can always retire within the fort in case of necessity. The forts are very strongly built—so much so that in the attack on Nalt our mountain guns were found to be quite useless, and, as you know, gun-cotton and a storming-party had to do the work.

When Conway comes home you will see photographs, pictures, etc., and the diaries, which will give you a good idea of what an interesting place this is; and he will also be able to describe the road which connects Hunza with Nagar, and his experiences over the two rope-bridges on the way—the worst that I myself have been over.

We are now going up to a place called Batter Mal, from where we have a pass from Yarkand to explore, and three passes over to Baltistan, called Hesper, Nustak, and Arindu. Everything is so immense: passes from one valley to another which take four, five, and six days to cross. Imagine Mont Blanc put on to another mountain without making much difference in its appearance, and if you can do so you will get some idea of the country. The deep valleys, however, are utterly different from anything in Europe. An African desert crumpled up into valleys and rocky precipices describes their scenery; the bottoms of the valleys stony and sandy, and, except where irrigated, without a blade of anything; most trying to walk through, and owing to the badness of the paths, exceedingly difficult to ride through, although the people of the country, and those who are accustomed, ride at a great

pace along the most precipitous paths, over which I always feel inclined to jump off and lead my pony. However, Alius, my pony, who met me in Gilgit, was always first-rate over rough paths, as she is a hill-born pony from the Waziri country, north of the Bolan Pass to Quetta.

I have been having and watching tremendous games of hockey up here with the men of Nagar, and various Gorkhas of my own and of a Kashmir detachment quartered here. There is a capital polo ground, of the native shape. A most blowing game, 8000 feet above the sea. At the beginning of the game and after every goal both sides start from the same goal, and tear down the middle of the ground, yelling; when they arrive in the middle, the man who holds the ball throws it up in the air and hits off without stopping his pace, and then the scrimmage begins, sticks flying all over the place. Everyone hits as hard as he can, and whisks the stick round his head. In Gilgit we've had nearly as many men in hospital from hockey as from everything else put together.

My next letter will probably come by way of Askardo, as we shall soon now be over the Passes. As soon as we are over we can then really say that we have accomplished something.—Your loving Son, C. G. Bruce.

ASKARDO, July 11th, 1892.

HERE I am, arrived by the Nushik Pass. I ought to have been back with Conway five days ago, but, as you will see, appointments at a certain time in a virtually unknown mountain country can't always be kept. Here is a little account of the passage. From Hupar, above Nagar, on the way to the Hispar Pass, or Biafo Glacier, Conway and I arranged that I should cross the Nushik—which had been tried but never crossed by a European—and bring him back from Baltistan, salt, grain, and 25 to 30 coolies. Accordingly, I set out on June 27th for Hispar, which, we were told, we could reach in a day; which we did in a hard day of 13 hours, scrambling over a vile road. The next day at Hupar I arranged for men to cross the Pass with me, and got seven first-rate men, the best as a lot I have seen at all. On the 29th I left Hispar for Magerum (which is placed too near Hispar on the map), and arrived there in 11 hours—at least 9 being on moraine or moraine-covered glacier—a most tiring amusement. The following day, in breaking weather, we reached Hikutum (marked on the map Hyonkum), at the mouth of the Hispar. Here we arrived in snow at three o'clock in the afternoon. It then proceeded to snow for 40 hours, during which I had to make an expedition down for three hours to cook. July 2nd was fine after seven o'clock, with a brilliant sun, so on July 3rd we started for the Pass at 4 A.M. We had been originally told that the Pass was good enough for ponies, but no one had been over it for 20 years. An old man, who accompanied us, had been over in his youth, however, and knew the general direction of the way. We left the huts at Hikutum, and descended on to the small Nushik Glacier, which is a tributary of the great Hispar Glacier. The glacier is a good deal crevassed, and I found it necessary, within half an hour from leaving camp, to put the rope on to the four leading men. In twenty minutes more we turned to the left on to steepish slopes of snow-covered glacier, which was occasionally just sufficiently hard frozen to let us in suddenly over the knees. After a rise of about 700 feet we bore right diagonally across the mountain, crossing two or three large crevasses. After about three hours we came to a place which made me stop and consider. Directly in front, along the way that the old man with us remembered, was a steep snow-slope, which measured 52° of steepness, and terminated in an ice-precipice. Across this lay the direct route to the col. To the left

and immediately above us, were steep snow-slopes, and a great crevasse, crossed by a doubtful bridge—a longer much but rather better way, with no fear of starting an avalanche. The snow on the first-named steep slopes did not please me. I was afraid of the whole surface coming away with so many men as we were; but two of the Hisper men knew better than I, and, roping themselves together, and taking my axe, they trod and cut steps right across the face. These men are quite at home in snow, and understand the use of the rope and axe very well, though our European axe is very much better than their own style. We all crossed after them, keeping good intervals, so as not to put too many men together. From here to the col, over some more crevasses and steep slopes with rather shaly snow, along a short but unpleasant way under the great cornice, which follows the whole ridge, and then Parbir cut through the said cornice and let us out on to the top of the col, 16,800 feet above the sea. Time 9:15 A.M. From here to our camping-ground, which we reached at 3:30 P.M., was easy, and we travelled rapidly. The next day, long and tedious, and much moraine, took us to Arimdo, which we were very glad to reach, as for two days we had been on very short commons indeed.

At Arimdo we stopped for one day, to eat chiefly, and then were obliged to go off to Askardo to get boots mended, stores of several sorts, &c. I had to give up recrossing the Nushik for several reasons—the distance to go from Askardo, the difficulty of arriving at the ridge in the early morning from this side, and the danger of crossing, owing to the whole of the Passa being greatly exposed to avalanches, unless the weather is very certain.

When we arrived at Molto, near the junction of the Rasha and Baldo Rivers, I gave up walking, and took to a small skin-raft of inflated goat-skins fastened together with withes and managed by four men with poles. It is a very wet and exciting mode of progression, as one is carried at from 9 to 10 miles an hour, and occasionally very much faster in the great rapids, down the river.—Your loving Son, C. G. B.

Orthography of Native Geographical Names.

By Lieut.-Colonel J. C. DALTON, R.A.

GERMANY has just taken an important step in the direction of securing uniformity in the rendering of native names, both in writing and orally, by the appointment of a special committee to thrash out this difficult question so far as the German Protectorates (*Deutsche Schutzgebieten*) are concerned. The committee, which, as will be seen, was a very strong and representative one, was convened by the Government, and the results of their labours have been accepted and made law.

We in England have not been idle in this respect. A code of rules, drawn up by the Council of the Royal Geographical Society in 1885, and revised in 1891, has been accepted by the Admiralty, War Office, Foreign, Colonial, and India Offices. A further and most important step was made when the Congress of the United States of America adopted our rules almost *verbatim*, and gave orders for an alphabetical list of all place-names in United States territory to be drawn up based on these rules, which list will be the only recognised

authority as to the spelling of the said names. But we in England have not as yet got any official list of geographical place-names made, and must trust to future cartographers and historians adhering as far as possible to the rules above alluded to, which have been extensively circulated to most parts of the British empire.

The preparation of a list which shall contain the native place-names of the British possessions all over the world is a colossal undertaking; but it is being considered by the Royal Geographical Society, and it is hoped that in course of time gradual but sure progress will have been made towards this end.

The following is a translation of the new German rules as they appear in the 'Deutsches Kolonialblatt' of August, 1892, viz. :—

ON THE ORTHOGRAPHY OF GEOGRAPHICAL NAMES IN GERMAN PROTECTORATES.

At the last Session of the Colonial Council ("Colonialrat") in April, 1892, amongst other questions which were brought forward for consideration was that of the introduction of a uniform system of writing and pronouncing the geographical names of places in the German Protectorates.

The Council recognised the necessity for settling this question, and resolved to petition the Foreign Office to appoint a committee of competent persons, in conjunction with three members of the "Colonialrat," to draw up a uniform system for writing and pronouncing these names.

A Committee was appointed on these lines, and has met several times, under the presidency of Dr. Herzog, Secretary of State and Privy Councillor (Member of the "Colonialrat").

In the deliberations of the Committee there took part, in addition to a commissioner of the Colonial Department, the following gentlemen: The Doctor of Philosophy Buttner, as delegate of the Oriental Seminary; Doctor Freiherr von Dannekeimann, as editor of the 'Reports of Explorers and Savants in the German Protectorates' (Mittheilungen von Forschungsreisenden und Gelehrten aus den Deutschen Schutzgebieten); Ober-Postrat Kratke (Member of the "Colonialrat"); Captain Mensing, of the Navy, as delegate of the Imperial Admiralty; Professor Dr. Freiherr von Richthofen, for the Geographical Society of Berlin; and Herr E. Vohsen, Member of the "Colonialrat." The Committee drew up the following rules, which, after acceptance by the Admiralty and Postal Department, have been approved by the Imperial Chancellor:—

UNIFORM SYSTEM OF WRITING AND PRONOUNCING GEOGRAPHICAL NAMES IN GERMAN PROTECTORATES.

For Official Use.

All geographical notations which are of European origin, or taken from proper names, will preserve their original form when written. All common geographical notations, such as mountain, river, lake, village, town, &c. (Berg, Fluss, See, Dorf, Stadt, u.s.w.), taken from European languages, will, as a rule, be rendered in German.

As to other geographical names in German Protectorates, the following rules will guide the system of spelling and pronouncing:—

I. The name must be so written as to give the sound as phonetically as possible with simple characters.

II. Vowels and diphthongs will be written as they sound in German:—

au, eu, oi, and oy will be written *oi*.

ai, ei, ay, and ey "*ai*.

The order of vowels and diphthongs is therefore, *a, e, i, o, u, ä, ö, ü, oi, ai, au*.

Vowels will be doubled in writing when they are to be pronounced separately. If diphthongs are to be pronounced separately, one of them will be marked with a diæresis (·). If a vowel is to be specially lengthened, it will be marked with a circumflex (^).

III. The following rules apply to consonants:—

(1) Compound consonants will be split up into their component parts, *e.g.* :

x = ks; *z* and *c = ts*.

(2) The following will be used precisely as in German, *viz.* : *b, d, f, g, h, k, l, m, n, p, r* (meaning the lingual *r*), and *t*.

(3) *y* will be used in place of the German *j*.

(4) *j* will express the sound of the French *j*.

<i>dj</i>	"	"	{ English <i>j</i> .
			{ French <i>dj</i> .
(5) <i>sh</i>	"	"	German <i>sch</i> .
			{ German <i>tsch</i> .
<i>tsh</i>	"	"	{ English <i>ch</i> .
			{ French <i>tch</i> .
(6) <i>v</i>	"	"	German <i>w</i> .
<i>w</i>	"	"	English <i>w</i> .
<i>kw</i>	"	"	German <i>qu</i> .
(7) <i>kh</i>	"	"	German guttural <i>ch</i> .
<i>gh</i>	"	"	{ German <i>ch</i> , though pronounced softer;
			{ the so-called uvula "r."
<i>kk</i>	"	"	German <i>ck</i> .
(8) <i>s</i>	"	"	soft German <i>s</i> .
<i>š</i>	"	"	the sharp <i>s</i> (German <i>sz</i>).
(9) <i>ts</i>	"	"	German <i>z</i> and soft <i>c</i> .

(10) The following German symbols are dispensed with as superfluous:—

c (= *ts* or *k*).

ck (= *kk*).

ch (= *kh*).

sch and *tsch* (= *sh* and *tsh*).

qu (= *kw*).

x (= *ks*).

ph when pronounced *f*.

z (= *ts*).

(11) The letters *j, v, w, y*, will be employed otherwise than as in German.

IV. When names are made up of several words, these will, as a rule, be separated, but joined in writing by hyphens.

V. To lay stress on a particular syllable, an acute accent (´) will be employed, except in cases where, as in Rule II., the circumflex is employed.

VI. A list will be made in accordance with the above rules of the best-known names in the Protectorate concerned, which list will be gradually amplified and extended.

VII. The way in which a geographical name is to be pronounced and written

must first of all be determined in the Protectorate itself. It is therefore recommended that the officials and persons appointed to this work be provided with instructions to write down the names after most carefully acquiring the sound, and then spell them according to the above rules.

VIII. On acquiring the sound of a name, care must be taken that it is written down as it is pronounced by the natives of the place. Further, it must be ascertained whether the name consists of one or more words which have a particular meaning. A uniform system of writing such words must be adopted. The official at the head of each Protectorate should satisfy himself, by local means at his command, that the names which have been submitted to him are correct as to their sound and orthography, and periodically furnish lists to the Foreign Office.

IX. The Foreign Office will nominate a Standing Committee of qualified persons whose duty it will be to go through the incoming lists of new names (VIII.), keep up the list mentioned in Rule VI., consider any necessary additions or omissions of symbols (II. and III.), and endeavour to check any irregular system of orthography.

X. The names fixed in accordance with the above rules are exclusively to be employed in all official intercourse in and concerning the Protectorates. They will from time to time be published either in the 'Kolonialblatt' or in some suitable way, with a view to ensure their being employed in maps, the daily Press, and in other printed documents.

For the system of the Royal Geographical Society, reference may be made to the 'Proceedings' for February, 1892, p. 118. A comparison of the two will, I think, show that, with a few exceptions, the German rules agree with ours, though they are not quite similarly arranged and treated.

The importance of this cannot be exaggerated, when we remember that some of the leading geographers of the world are German-speaking, and that their work must always be largely consulted by English map-compilers. It may be assumed that the best cartographers are sure to fall into the official style of orthography as soon as they can get the necessary revision of their maps made.

I propose to deal with the German rules in order, drawing attention to any marked discrepancies between their system and ours, and, when necessary, quoting the number of the paragraph or rule referred to. First of all, I remark that words of European origin, or taken from proper names, are to preserve their original form. This is practically our rule, though we go a little farther, and do not change the spelling of old names, of which the spelling, though not in accordance with our rules, is nevertheless so world-widely known that it would be useless to attempt to alter it now at the eleventh hour.

Next, it will be seen that the Germans insert their own words for geographical physical features, such as mountain, river, lake, village &c. Thus, they would talk of Kilimandjaro Berg, instead of prefixing the native name, as, for example, is done in Kiepert's map of East Africa, where we read *D.* (signifying Doenjo) for mountain.

The Royal Geographical Society's rules are only for orthography, and

do not discuss this question; but this is a rule we might with advantage follow (and many of our maps do), and instead of talking of *J.* (Jebel) Mokattam, call it Mt. Mokattam, and soon. Kiepert, in his map of East Africa, 1891, uses the symbols:—

N. (Ngare) for stream.

G. (Gnas) for river.

D. (Doenjo) for mountain.

Such a system is confusing, more especially because, not unfrequently, a map on a small scale of a large extent of country might embrace countries which differed entirely as to their names of geographical physical features. It would be well if every map bore at the bottom a note explanatory of all abbreviations used in the language of the country in which the map is produced.

Taking the rules in succession:—

Rule I. agrees with the Royal Geographical Society's rules.

Rule II. The Germans have so many diphthongs, and vowels modified by the addition of a "trema" (¨), that it is naturally less easy to draw up spelling rules to suit the German than it is to suit the English and other European languages. As the German pronunciation of their vowels is to all intents and purposes the same as the Latin (as we accept it), the rules in question, as adopted by the Germans, are very similar to those made by the Royal Geographical Society, and recently revised by the Council of that body, which rules, moreover, have been practically adopted by all English-speaking nations.

It seems to me that the blot in the German system (but one which it is difficult to see how to avoid), is, that the Germans find it necessary to use *diacritical signs* to express certain sounds. Let us take, for example, the German *a*, *o*, and *u*. It would seem as if the first of these was unnecessary, and might be rendered by the vowel *e*. If there were such a word to be expressed in writing as the German *Bar*, why should it not be spelt *Ber*, as it would be by the Royal Geographical Society's rules? If the *a* be followed by a *u*, as in the word *Baum*, the German rules direct that it shall be spelt *Boime*. We also would probably express the sound thus, as being the nearest approach to the proper sound.

If the *ä* be followed by a consonant, as *Bönde*, it would be approximate to the sound to spell it *Bende*. Hence, the *a* would almost appear to be redundant.

With regard to the *ü* and *û*, it certainly seems difficult to say how they could be rendered by our system; but if we remember that these rules are mainly made by the Germans for African and New Guinea names, the question arises whether there is any necessity for expressing these niceties of sound.

As I have not myself been in any of the German Protectorates, I

cannot say whether the pronunciation of the local names in these countries demands such niceties as *ä*, *ö*, *ü*, but I feel sure that the fewer varieties of sound representations there are, the simpler and easier will be the work of transliteration, more especially because the best that can be arrived at is after all only an approximation. The simplification of the German diphthong sounds in the rules above quoted appears very reasonable; but it seems hardly necessary to employ a circumflex accent (*^*) to denote the lengthening of a vowel, because it adds one more to the diacritical signs already in use, and Rule V. lays down that an acute accent (*'*) will be used when stress has to be laid on a particular syllable. It seems hard to distinguish between the lengthening of a vowel and the stress on a particular syllable. Supposing the word in question was *Galapagos* (Islands), it would be rendered according to the English rules as *Galápagos*, because the stress is on the second syllable. As the second *a* is lengthened, it would, according to the German Rule II., have a circumflex accent over it, or, according to Rule V., it would have an acute accent. This perhaps is not a very good example, because *Galápagos* is not a place in the German Protectorates, and is a Spanish word; but if the word *Muasi* or *Muasi* (in German East Africa) be taken, I do not see how, if the *a* is long and the second syllable is to have a stress on it, there would be any necessity for more than the acute accent over the *a*.

Rule III.—The German rules as to consonants differ but little from the Royal Geographical Society rules, the chief exception being, that the former authorise the use of a *j* to represent the French *j*, whereas the latter would use *zh*. Personally, I must confess I sympathise with the German rendering in this case, as I can see no advantage in introducing an impossible English combination of two letters to represent one which to many ears differs in so slight a degree from the ordinary English pronunciation. But, on the other hand, the Germans use *dj* for the English *j*, and here the German and English systems clash. Hence, as the sound of the *j* plays no unimportant part in transliteration from the Arabic and African dialects, it will have to be carefully noted by cartographers, whose duty it is to compile maps from those of German origin, that the German *dj* will have to be converted into the English *j*, and the German *j* into the English *zh*.

The German rules also use *tsk* where we use *ch*. The *t* here seems redundant, and the *ck* would have sufficed. The German rules lay down that their *ck* is to be rendered by *kk*. At first sight this would seem a nicety which is hardly necessary; but on the principle adopted by the Royal Geographical Society in their rules, that, in order to shorten a vowel, the following consonant is doubled, there does not seem to be much variance between the two systems. Let us imagine an African word which in sound approaches most nearly to the German *blick*. The Germans would render this as *blikk*; and so would

we, because if we spelt it *blik* it would be pronounced as in the English *bleak*, but by doubling the consonant we shorten the vowel.

The German *ä* seems hardly necessary. It introduces another troublesome sign for cartographers and lithographers, and one which might easily be confounded with portions of a dotted route on a map which happened to come above it; or again, an *e* might be wrongly interpreted to be a *ä* because a spook on the stone or plate happened to be printed over it. After all, to the ordinary ear there is not much difference if the German sound *muez*, &c., be transliterated *mus*, instead of *muä*. Perhaps the best rendering of all would be *muß*, the vowel being distinctly short, in the same way as *blikk*, above.

As to the remaining rules, Rule V. could, in my opinion, with advantage include the latter part of Rule II. (as to the circumflex), which might be omitted.

Rules IV., VI., VII., VIII., IX., and X. are all excellent, and must prove most valuable. They will cause some trouble to begin with, because hitherto German cartographers have followed no common system as to their spelling, as will be seen from the following examples, taken at random from three well-known German maps:—

(1) *Justus Perthes' Map of Africa, 1892, gives:—*

Mwemusche, which would by new rules probably be Mwemusche,
or Mwemustahe, according to what is meant.

Schuguli, which would by new rules probably be Shuguli.

Sanga-tschumi, " " " Sanga-tshumi.

Mpuapua, " " " Mpwapwa.

In this map there are no accents or diacritical signs, except on pure German words such as *Hügel*, etc.

(2) *Kiepert's Map of German East Africa, 1891, gives:—*

Mpwapwa, which, by new rules, would be the same.

Kiepert does not use accents or diacritical signs, and gives the following explanation of his spelling:—

dj, as rendered by him, has sound of *dsch*.

ä, " " " soft *s*.

ä, " " " sharp *s*.

He gives the name of a stream as *N. (Ngare)*.

" " river as *G. (Guaso)*.

" " mountain as *D. (Doenjo)*.

whereas, by the new rules, they would be shown as *Bach*, *Fluss*, and *Berg*.

(3) *Engelhardt's German East Africa, 1890, gives:—*

Mangotscho, which, by new rules, would be Mangotsahe.

Jaja, " " " Yaya.

He uses the German words *Falle*, *Hafen*, *Bai*, *Inseln*, &c., and not the native equivalents, and does not use accents.

(4) The *Deutsch Ost-Afrika* Wall Map, ¹/_{1,000,000}, by the Colonial Society, gives:—

Mtschandji,	which, by new rules,	would be	Mtshandji.
Tschakwana,	"	"	Tsbakwana.
Muasi,	"	"	Mwasi.

From the above comparison, it will, I think, be admitted that the new German rules approach very near to those adopted in this country and in the United States, and this must be a matter of satisfaction to all interested in geographical science and literature, and, above all, to cartographers; but we cannot at the same time help regretting that some of the exceptions to which I have alluded should have been found necessary.

The addition of examples of names spelt according to the German system would have greatly facilitated the explanation and meaning of their rules, but as authoritative lists of all names are about to appear, it was perhaps thought unnecessary to give examples.

It has been suggested by those members of the Orthography Committee of the Royal Geographical Society who have perused the above remarks, that as the German rules approach so closely to ours, and as the United States rules and ours are practically identical, it would be well to endeavour to come to an agreement between the three countries. If a small international committee of, say, one expert delegate from England, the United States, and Germany, respectively, were to meet and thrash out the few discrepancies, and come to a common decision, there would probably be no difficulty on the part of the scientific representatives of the three countries (and of the respective Governments) in adopting the conclusions thus arrived at.

Each country might perhaps have to make some slight concession, but if uniformity were secured such concessions would be amply justified. I entirely concur in this suggestion, and commend it to all who are interested in cartography.

Mr. Rockhill's Travels in North-East Tibet.

THE following extract of a letter addressed to Mr. E. Delmar Morgan from Mr. W. W. Rockhill, the well-known Tibetan traveller, who is now exploring north-eastern Tibet, will be found interesting. The letter is written from Oim (Baron Ts'aidam*), and is dated April 19th,

* Probably identical with Baron Zsask of the late General Prejevalsky in lat. 36° 10', long. 97° 30' E. approx. See map in 'Supplementary Papers,' Vol. III, Part I.

1892. Referring to Vol. III., Part I., of the 'Supplementary Papers,' R.G.S., Mr. Rockhill writes:—"In the postscript you say that a little doubt is thrown on the correctness of my information as to the names of the two lakes to the east of Karmat'ung.* I have within the last month inquired of a large number of Panaka and Ts'aidam Mongols, who have been to the lakes many times, what were their names. They have all answered, 'Jarang Norang' (the usual corrupt pronunciation of the Tibetan words *Rgya-ring* and *Suon-ring*), or 'Ts'aka-Tsaga.' Ts'aka does not necessarily imply that the lake is salty, but only that salt is found along its shores. This is the case with the Ts'aka in question, for the Golok get on its shores nearly all the salt they use.

"Another point is as to the name of the *Upper Bayan gol*, the principal river of the Ts'aidam. It is known in *Shang* as *Yohur gol* (or 'Ch'uk'a when a Tibetan is speaking), and as *Bayan gol* west of *Shang* when it enters the plain. No other name is ever given it. (I write the name phonetically; it is a Mongol word, meaning, I am told, 'medicine'). On Prejevalsky's map the name figures as *Yegrai*, but if my ear serves me at all well, this does not approximate very closely the sound of the Mongol word.

"It may be of interest to you to know that after a very interesting visit to the Salar (Turki tribes, *soi-disant* from Samarkand) living on the Yellow River west of Hsün-hua-T'ing, and the Rongwa Tibetans of the Kuei-te district, I came to the Ts'aidam by a previously untrodden route south of the Kokonor by the Bayan (or Wayen) nor, Gunga nor, Huynyung, and Muri-Wahon (south-south-east of the Ts'aka or Talc'-dahesu nor, to the east of Dulan Kue). Thence I came over a range certainly not less than 10,000 feet high, into the basin of a river flowing into the Ts'aidam swamp, the Ts'ahan ossu† (its lower course is marked on my route map as *Sharo gol*, its name in the plain). I followed down its course for some 40 miles, and then taking a direct route west (the river making a big bend north-west before entering the plain), reached the village of *Shang* on April 4th. After a few days I went again to the *Tosu nor*,‡ the west end of which I make to be in lat. 35° 27' N. (observations subject to correction). This lake, which I believe I am the only foreigner to have visited, is certainly not less than 35 miles from east to west, and about 2 to 2½ miles in breadth. Its altitude is less than I had made it in '89. I make it now to be a little over 13,000 feet above sea-level—1000 feet lower than the Western lake (*Along nor*).

* Prejevalsky's *Ghamattyn*, or *Odon-tala* (Sincé, Sing-en-hai) = The Plain at the Source of the Yellow River.

† Probably identical with the *Tsasa gol* of Prejevalsky (cf. map, 'Suppl. Papers,' *ibid.*

‡ This lake is marked indefinitely on the above map as *Tosu nor*, in approximately the same latitude as that assigned to it by Mr. Rockhill from actual observation.

"I have about perfected arrangements with Mongols here to go as far as the Tengri nor, as I have found it impossible to get any of them to agree to go to Lh'asa, so determined are the Tibetans to keep us out as long as possible. The Mongols returning from Lh'asa tell me that at Nagoh'uka, and at several other localities north of Lh'asa, they were searched and cross-questioned by officials and soldiers from Lh'asa as to whether they had any foreign goods with them, that they were told that not only foreigners, but everything from their land, was now excluded from Tibet.

"I am unable at present to say where I will get to, but hope to be able to do useful geographical work. I have surveyed all my route from Chang-Chia-Kou* (Kalgan) here with prismatic compass, taking astronomical observations for latitude and longitude every two or three days, which, though I do not believe they will prove absolutely accurate, will serve to fix temporarily a considerable number of points on the map.—I am, &c., W. W. ROCKHILL."

Notes on M. Dauvergne's Travels in Chinese Turkestan.

By GENERAL J. T. WALKER, C.B., F.R.S.

Map, p. 816.

THE recently-published Bulletin of the French Geographical Society for the first quarter of 1892 contains a very interesting paper by M. HENRI DAUVERGNE, entitled, "*Exploration dans l'Asie Centrale*," and illustrated by a map of his journey. M. Dauvergne is a French gentleman who has resided for some years in Kashmir, and had previously made excursions across the Himalayas to Kashgar and the Northern Pamirs. In 1889 he again crossed the great ranges into Turkestan, and travelled along the northern slopes of the Kuen-Lun and the Hindu Kush Ranges to the Southern Pamirs and the sources of the Oxus. He left Srinagar on June 22nd, and followed the well-known route from thence eastwards to Len and northwards over the Karakoram Pass as far as Suget and Sanju Kurgan. Thence he struck north-west over the Kiban Pass, taking a route which, though known, has not, so far as I am aware, been ever travelled by a European, and he maintained a line of exploration of his own from thence westwards for a considerable distance, until he reached the sources of the Oxus. Descending this river until he reached a point opposite the Baroghil Pass, over the Hindu Kush Range, he crossed over into the Mastuj-Chitral Valley and ascended it, and then crossed a very difficult and previously unexplored pass leading into the Karambar Valley. Thence he returned *via* Gilgit to Srinagar, where he arrived on November 8th, after an interesting journey of four and half months' duration, over a distance of 1500 to 1600 miles, much of which had not previously been travelled by any European.

M. Dauvergne's object seems to have been primarily to enjoy himself and shoot *Ovis Poli*; but he evidently had some intention of acquiring geographical

* Or Chang-Kia-Kou (cf. Prejevalsky's '*Mongolia*,' i. 34).

information also, as is to be inferred from the summary of geographical results which he gives at the end of his paper. It is not stated whether he took any surveying instruments with him, nor is any account given of the method followed in the construction of the map which is given to illustrate his route. He does not seem to have kept up a systematic record of the bearings and distances along his line of route; but he was probably provided with an aneroid barometer, as he gives a large number of heights, which can only have been determined with the aid of some such instrument. The map is very questionable in several particulars, and occasionally disagrees with the narrative, but it is of importance in that it gives some new geographical information, and more particularly in that it restores Captain Trotter's rendering of the upper sources of the Yarkand River, in the map illustrating his paper on the geographical results of Sir D. Forsyth's Mission to Kashgar, which is given in the 'Proceedings' of this Society for 1878. Thus it greatly differs from the recent rendering of that river by the Russian officer, Captain Grombechevsky, in his map of Kanjut, Raskam, and Sarikal, which is published in the 'Izvestia,' Vol. XXV. (1889) of the Russian Imperial Geographical Society.

The operations of the Great Trigonometrical Survey of India have been carried northwards up to the great Himalayan Ranges, and have fixed the positions of all the principal peaks on the line of the water-parting between India and Turkestan. All this was done more than twenty-five years ago, but as yet no regular survey of the regions beyond has been attempted. Thus the delineation of those regions in the Indian maps has rested entirely on the route-surveys executed by or under the direction of Captain Trotter and by Mr. Hayward, the details of the course of the rivers and the positions of places off the route-lines being filled in from native information. Consequently, when Captain Grombechevsky's map was published, it was immediately accepted as the first work of a trained geographer in regions which had not yet been fully explored. It was therefore taken as the basis of the map of the Pamirs and adjacent regions, which is given in our 'Proceedings' for last April, to illustrate Captain Younghusband's account of his travels.

Mons. Dauvergne and Captain Trotter show the Yarkand River as rising in the northern slopes of the Mustagh section of the Hindu Kush Range, in long. 78° , then flowing N.W. to long. 70° under the name of the Zarafshan River, then N. and N.N.E. to Kosarab (Kusharab), in lat. 38° , where it enters the plains, and proceeds to Yarkand. Captain Grombechevsky makes it rise in the same region, and carries it a little above the parallel of 37° , then makes it strike to the N.E. across a range in Raskam, and flow to the S.E. for some 20 miles, when it again turns suddenly to the N.E. This last bend occurs near the village of Tash-Khan, which Captain Grombechevsky is stated to have visited, and which he places about 60 miles due south of Kusharab. He then makes the river flow on to Yarkand under the name of the Raskam River. He gives the river which flows by Kusharab a length before arriving there of only 30 miles, whereas, according to M. Dauvergne and Captain Trotter, the river has a course of over 200 miles before it reaches Kusharab.

This discrepancy of course arises from the circumstance that neither of the explorers followed either of the rivers through its entire course; each struck various rivers at various points, and acquired certain ideas as to their identity from native information, which is not always to be relied on. Captain Grombechevsky appears to have gone over the ground most closely, but not to have seen the peculiar wanderings of the river above Tash-Khan which he shows on his map; moreover, it is by no means certain that his rapid route-survey up to Tash-Khan is to be accepted as altogether correct.

Captain Younghusband does not throw any light on the subject in his paper;

he brought no maps with him from India, and his route was inserted into Captain Grombchevsky's topography by Mr. Sharbau, our chief draftsman, from such information as he could give orally. He travelled along the principal source of the Yarkand River, and brought to light a very important range—the Aghil—not previously laid down on any map. He crossed this range and got into the Oprang Valley, which lies between it and the Mustagh Range, and, making various incursions into the higher mountains, he descended this valley until he reached Chong Jangal (lat. $36^{\circ} 40'$ by long. $76^{\circ} 10'$), where the Oprang River joins the main branch of the Yarkand River, which he had previously diverged from. It is just below this point that the discrepancy between M. Dauvergne and Captain Grombchevsky commences; but though down to this point Captain Younghusband gives many details of his movements and the country through which he is passing, he gives none whatever of his journey from Chong Jangal into the Tagh-dum-bash Pamir, beyond saying that "on the first march after leaving the Raskam River he met Captain Grombchevsky, and spent two days with him. He then started for the Tagh-dum-bash Pamir, and, "crossing an easy pass, 14,600 feet high, named the Kurbu, or Ili-su, found himself free of the high cliffs and lofty mountains which shut in the valleys of the Yarkand River and its tributaries." According to the map the direct distance from Chong Jangal to the Ili-su Pass is over 40 miles, and it appears to have been travelled without any fact of importance as regards the course of the Yarkand River presenting itself to Captain Younghusband's notice; but it is in the neighbourhood of this very region that the discrepancy between M. Dauvergne and Captain Grombchevsky originates.

I am not prepared to express any opinion as to which of the two explorers is correct; but in the interests of geographical science, as regards a region which is of some importance to this country, it is desirable that our 'Proceedings' should contain some account of M. Dauvergne's explorations over new lines of route. I have therefore taken from his journals the following brief outline of his route, commencing at the point near Suget at which he left the main road from the Kara-Koram Pass *via* Sanju to Yarkand, and took up a new line of route. I give all the bearings and distances and heights of passes which are given in the report. A map is also given, which is a facsimile of part of his own map, excepting that it is slightly reduced in scale in order to correspond with the map of the Pamirs and adjacent regions in the April number of our 'Proceedings,' with which it should be compared.

Leaving Suget, he descended the course of the River, Karakash and encamped at Olbug, and the following day at Sanju-Kurgan. Here two roads bifurcate, and he took the route to the N.W., and ascended a stream from the Kuen-Lun Range, and encamped on a little plateau midway to the Kilian Pass. Next day he crossed that pass—17,450 feet high—on the frontier of Chinese Turkestan—and descending the steep slopes to the north, encamped at Karashagul, and on the following day at Shuskium. He next halted at the mouth of the valley of Namelung, where he decided to quit the caravan route to the north and turn westwards, across the spurs of the Kuen-Lun Range, in order to avoid any difficulties with the Chinese officials. Ascending the valley of Namelung, he reached an encampment of Wakhan Kirghiz, by whom he was hospitably received. He crossed the Namelung Pass, 12,140 feet high, and descended into another Kirghiz encampment. He had still five passes to cross before reaching the valley of Kugiar. The next day he crossed the Saraghat Pass, 13,250 feet high, and found the ground covered with fine dust, blown from the Gobi Desert, which enabled the horses to cross it easily. He then encamped at the foot of a glacier with a plentiful supply of good water. The next pass crossed was the Tuslar Davan, 14,600 feet high, which brought him, after a march of about 20 miles, to the shrine of Sultan Kalitch, in a little grassy plain. Thence making a

short march of 6 miles, he descended to Damastang and encamped among willows and birch trees on the bank of the Kargalik River. Next day he crossed the Tupa Dawan Pass, 15,400 feet high, and descended a small river flowing to the north, through a great opening in a second chain parallel to the Kuen-Lun. This chain, he says, is not shown in any map, though it has peaks rising from 16,000 to 19,000 feet. It is cut through by rivers flowing from the Kuen-Lun Range across this second range, to lose themselves in the Lob-nur, with the Kizil-su and the Zaratshan Rivers.

The fifth pass crossed was the Sanleh Dawan, 16,170 feet high. He passed a great peak to the north, on his right, which he estimated at 19,000 feet high, and descended into the Sanleh Valley, where he found a plain of good grass and the tents of Wakhan Kirghiz. Thence he crossed the sixth pass, the Kichikim Dawan, height 15,800 feet; but the pass is double, so that he had to descend and reascend 2500 feet, and finally descend 6700 feet, before reaching a little encampment of Kirghizos, at Ak Masjid, near the head of the Kugiar Valley. Here, a short distance off, he found an encampment of Russian soldiers commanded by Colonel Plewtaoff, who welcomed him very cordially. The next day he made a long march down the valley to the little village of Olonsu. His map shows this village to be a few miles south of Kugiar (Koghlar), and gives August 31st as the date of his arrival there. He was now at the edge of a desert of sand which stretches to the north towards the rivers Tisnaf and Zaratshan; and here he met two English sportsmen, Major Cumberland and Lieutenant Power. He parted from them next day, and turning W.S.W., crossed the Tupa Dawan, 10,100 feet high—which is also called the "Mountain of Dust"—and descended into the Tisnaf Valley, and after a long march of 22 miles encamped on the bank of the Tisnaf River, near a pretty village called Momu, inhabited by Turkis, where he found good water and plenty of grass, and purchased grain for his horses. Thence he proceeded westwards along the dry bed of a river, and encamped at Kiel, where he met several people of Kargalik who had come to cut down fir trees on the neighbouring hills, where alone firs are found on the Kuen-Lun. Here his route turned down a little river to the N.E. to the village of Askam Salgam, where he found good grass, and fields of oats, and wheat and Italian poplars. He continued following the river to the N.E. (?) for some distance, and then turned up another little river in the direction S.W. until he reached the little village of Shushu, and encamped on the plateau of Donya, among a clan of Wakhan Kirghiz. The next day he crossed the Takta Dawan Pass—height 13,400 feet—over mountains clothed with spruce firs, junipers, and some birch trees. He descended into a very deep gorge, and met with a little river coming from the west, which apparently joins the Zaratshan River at Kosurab (Kusharab). He ascended it to Egisarak Kurgan, a little square fort occupied by some Turki functionaries in the service of the Chinese. Here he found some primitive furnaces for extracting copper from the ore, which is sent to Yarkand and converted into money by the Chinese.

Ascending the valley of Egisarak Kurgan, he crossed the steep Arpa'aliek Pass—12,435 feet—and descended through deep gorges of black cliffs, rising perpendicularly into fantastic peaks, the mournful and savage aspect of which it would require the pencil of Gustave Doré to delineate. Passing through these, he came on an expanse of grass and orchards of apricots, apple trees, and wild olives, with a few habitations, and the shrine of Babafulmahk, which is surrounded by numerous tombs. The village, he says, is best known by the name of Langar, a common name in Turkestan for villages situated at the junction of two streams or two roads. Here a small stream enters the river of Zaratshan, which flowed below his encampment, and the river lies between perpendicular rocks, which prevent all

passage along its banks. A day had to be spent in making preparations for crossing the Zarafshan, which was done on a raft supported by inflated skins drawn across the river by swimming horses, according to the custom of the country. The raft appears to have been taken across the river and back again more than once, for the crossing took more than four hours. It was very risky, but was accomplished without accident. The river was clearly far the most formidable of any of the affluents of the Yarkand River which he had to cross, and may be assumed to be the principal source of that river.

Thence he travelled a short distance along the left bank of the Zarafshan to the junction of the Tung River, where he halted two days. He describes the Tung Valley as very fertile, with an abundance of fruit and fish, but surrounded by inaccessible mountains, which convert it into a huge fortress, accessible only from the Zarafshan on the east and the pass of Kotal-i-Kandar on the west. He ascended the valley, and, passing the village of Kandlash, turned to the S.S.W., and encamped on a little plateau of turf 11,500 feet high; thence he went up a ravine, of which the direction is S.E., and scaled the steep slopes of the Kotal-i-Kandar, crossing a rugged sheet of frozen snow. The pass is 16,350 feet high, and commands a grand view—to the S.W. the snowy chain of the Mariom Pamir, extending as far as the eye can see; to the W. the Shaedun Chalu, concealing the valley of the Tag-dum-bash Pamir; and to the N. a great black mountain, which probably appertains to the chain beyond Tashkurgan. He descended with ease from the Kotal-i-Kandar, along a stream called the Ab-i-Uchi, down to a place where he encamped. The following day he reached the village of Kharak, which is surrounded by a loop-holed wall to guard against the attacks of Kunjuti robbers, who travel this way in their marauding expeditions to Yarkand and Kashgar. Thence he crossed the Ognart Pass, which is 12,400 feet high, and very easy, the mountains resembling the Tian Shan Range north of Kashgar. On the other side he found himself at an opening into the valley of Tashkurgan, and saw the fort of that name, with its white bastions, to the N.N.W., on the left bank of the Tag-dum-bash River.

The next day he proceeded S.S.E., over a plain of sand and stones, to the camp of the Kirghiz Pir Inman Bai, the great range of the Tagharma Mustagh being seen to the N.N.W. Then he proceeded to the junction of the Rivers Khanjerab and Karachunkar, at a place called Dabdar, where Sarikol Kirghiz were encamped. He ascended the Karachunkar to the W.S.W., crossed a great moraine, and descended into a plateau, in the midst of which he found the ruins of the Kunjuti Fort, known as Kurgan-i-Ujadbai, and, hastening on after a long march, reached the Kirghiz camp of Chadir Tash. Continuing his march westwards, he passed the mouth of the Mintaka Valley; he met a man of Raskam, who told him that the river of Raskam flows into the Zarafshan, and is one of its affluents. Proceeding W.S.W., he arrived in front of the Kilik Pass, which leads to Gulmit and Hunza, and continued his march until he reached a place called Kiuktlrup, 13,935 feet high. It was now September 24th; the northern slopes of the great Mustagh Range were all covered with snow, and the Kirghiz had quitted the higher ranges with their flocks to find a milder climate in the Tag-dum-bash Pamir.

After some days spent in shooting *Ovis Poli*, he decided to return to Kashmir via Gilgit, and, proceeding westwards, crossed the Wakij Kul Pass, 15,580 feet high, with a lake on the summit, and descended to the great bed of a river flowing westwards, and issuing out of three enormous glaciers. This river he found to be the Oxus. He encamped in front of the glaciers at an altitude of 14,200 feet: then descended 15 or 16 miles to a camp at 13,300 feet. Continuing 5 miles along the river to the N.W., he reached the shrine and ancient caravansery of Bozu Gumbaz.

He was now in the heart of the Little Pamir, and made an excursion to the Gaz-kul* Lake, which is the source of the Akau River.

He discusses the question whether the Akau or the Panjah branches of the Oxus are the principal source of the great river, and says it appears to him that the greater flow of water into the Panjah from the glaciers of the Hindu Kush Range undoubtedly show it to be the greater river, and the principal source of the Oxus.

Descending the Oxus three days' march he reached Sarhad Wakhan—10,500 feet; crossed the Baroghil Pass—12,400 feet; turned eastwards along the upper course of the Mastuj River until he reached the Isbkykul Lake, which drains into the Karambar Valley; thence he proceeded over a most difficult pass, never before crossed by a European, into the Karambar Valley, whence he went on to Gilgit, and returned to Kashmir without further difficulty.

M. Dauvergne concludes his narrative with the following summary of his contributions to geography.

I. That there is a second chain parallel to the great chain of the Kuen-Lun, on the north, towards Kashgaria.

II. That the river of the valley of Tung is an affluent of the Zarafshan, and not a tributary of the Tag-dum-bash River, as is shown in Russian maps.

III. That the sources of the Oxus are in lat. $37^{\circ} 10'$ by long. 75° east of Greenwich, and not in the Gaz-kul Lake, and that the waters of the principal branch of the Oxus issue from the great glaciers of the Hindu Kush Range.

IV. That the Karambar Pass, though very difficult, and stated by an English writer to be impracticable, is practicable, as he crossed it with a caravan of ten horses; and that the Lake Isbkykul,† at its summit, flows certainly into the Karambar Valley, and not into the Mastuj Valley, as has been reported by one of the native Indian explorers.

The above is a brief outline of M. Dauvergne's route and its geographical results. It certainly leads one to conclude that the Zarafshan River is the most important of the southern affluents of the Yarkand River, for he crossed all the other affluents with so little difficulty that he nowhere mentions the crossing, whereas the Zarafshan was large and deep, and was crossed with difficulty on a raft improvised for the occasion. He must have crossed Captain Grombehevsky's Raskam River; but he cannot well have confused it with the Zarafshan, for the account of his route makes the Zarafshan much further from Kugiar and nearer to Tashkurgan than the Raskam is shown to be. He specially dwells on the circumstance that the River Tung, which joins the Zarafshan on its left bank, is not an affluent of the Tag-dum-bash River, as he says it is shown to be in Russian maps. It is to be noticed, with reference to this statement, that Captain Grombehevsky shows a Tung River joining the Raskam River on its left bank, 40 miles E. of M. Dauvergne's junction of the Tung River with the Zarafshan. Possibly both maps are here endeavouring to indicate the same geographical fact, but if so there must be great error somewhere.

* The appellation Gaz-kul simply means Goose-lake, and there are many lakes so called in Turkestan. Mr Littledale was informed that this lake is called Chak Mak Kul, and it has therefore been given this designation on the map of the Pamirs in the 'Proceedings' for April.

† The lake has long been known to be the source of the Karambar River; but a native explorer, coming up from Mastuj, reached what he believed to be the same lake, which has therefore been conjectured to be the source of two rivers. It now appears that there are two contiguous lakes, separated by a low water-parting, so that each river has a separate source.

M. Dauvergne deserves every credit for the manner in which he has carried out an arduous and difficult journey, travelling over much ground never before traversed by a European. His arrangements seem to have been excellent throughout, and his relations with the people of the country were always most friendly and pleasant. As a traveller and sportsman he appears to have been very skilful and successful. As a geographer he is now in rivalry with Captain Grombchevsky, and it remains to be seen which of the two explorers has delineated the course of the southern affluents of the Yarkand River with greater accuracy.

What is now wanted is a fairly accurate survey of the northern slopes of the Himalayan Ranges on a small scale—say 1 of an inch to the mile; and there seems to be no reason why it should not be undertaken by the Indian Survey Department. Twenty-five years have elapsed since the surveys of Kashmir and Ladak were completed by that department, and then it was considered that enough work had been done in that region, and that the surveyors should be moved into other regions where they were more wanted. But now the time has arrived when a small party equipped for triangulation and plane-tableing, may easily be spared from India to render valuable service to geography in the Kuen-Lun Ranges and on the northern slopes of the Himalayas. It is greatly to be desired that the Government of India will take early steps to have a sufficiently good survey made of an important and interesting region on the borders of Chinese Turkestan, which is at present inadequately known.

*The Italian Geographical Congress of 1892.**

THE first National Geographical Congress of Italy was held at Genoa, from September 18th to 23th. The Congress held at Venice in 1881 was one of the series of International Congresses, held at Antwerp, Venice, Paris, and Berne, and to be held in London in 1895. It was a great success. The weather was magnificent; the attendance, chiefly Italians, was numerous; Genoa, always superbly beautiful, looked at its best. As is well known, in the preceding week the fourth centenary celebration of the birth of Columbus in this, his native city, took place amidst much pomp and splendour in the presence of their Majesties the King and Queen of Italy. The Geographical Congress commenced after the close of the festivities. There was an Exhibition of Arts of a general kind, and also a Geographical Exhibition, special to the work of the Congress, in a separate building.

H.R.H. the Prince of Naples was the Patron; H.R.H. the Duke of Genoa was the Honorary President, and took a personal share in the proceedings; the ex-President of the Italian Geographical Society, the Duke of Sermoneta, and three other Senators of the Kingdom of Italy, were Honorary Vice-Presidents. The actual President was the Marquess Doria, the President of the Italian Geographical Society. Professor Giuseppe della Vedova, the Secretary of the above-named Society, who is so well known to, and highly esteemed by, many English friends, discharged the office of Secretary of the Congress.

There were three Sections, as follows: (1) Scientific, embracing mathematics,

* In the absence of the four delegates appointed by the Council of the Royal Geographical Society to attend the Genoa meeting, the Society was well represented by its Gold Medallist and Honorary Corresponding Member, Professor Guido Cira, and the Rev. S. A. Steinthal, F.R.S., Chairman of the Manchester Geographical Society. Miss Cist attended on behalf of her father, Dr R. N. Cist, whose illness at the last moment prevented him from proceeding to Genoa as delegate.

physics, &c.; (2) Economic, and embracing political divisions, statistics, commercial and social features; (3) Educational. General and sectional meetings were held, and the time available was distributed to suit the convenience of members. An order of the day was published and distributed each morning. Each Section had its president and vice-president, and secretary; the former were elected daily.

In each Section certain subjects were put down for discussion, and certain papers received as communications; and the subjects were numerous and well chosen. The meetings and the Central Office were held in the Palazzo dell' Università, Via Balbi—a magnificent building. The general meetings took place in the great hall, and the Sections were held under the same roof, in side rooms.

On Sunday, September 18th, at 10 a.m., there was an inaugural meeting of the Congress; at 3 p.m. a preparatory meeting of the three Sections took place, to settle details for the meetings of the morrow.

On Monday, September 19th, at 10 a.m., the African traveller Casati, described as the fellow-traveller of Emin Pasha and Stanley, was received with honour. Messages of congratulation were received from different parts of Europe, and from Egypt. Discussions then took place as to the locality of the future Italian Congresses, and the interval between each. At 3 p.m. of the same day the Sections were very busy, the most important subject being that of emigration.

On Tuesday, September 20th, at 10 a.m., further messages of congratulation were received from different parts of Europe and South America. At 3 p.m. a great deal of discussion took place in the Sections—in the second Section mainly on Emigration; in the third on Geographical Instruction.

On Wednesday, September 21st, the members of the Congress were taken on board a steamer for a delightful marine excursion to both sides of Genoa, and no business was transacted.

On Thursday, September 22nd, there were special meetings of the three Sections. In the first Section the subject of Antarctic Exploration was considered; and it was determined that the subject should be studied with a view of something practical to be done when opportunity offered. In the second Section Emigration was the only subject; and resolutions were passed suggesting emendations of the existing law. In the third Section Geographical Education was the subject of earnest consideration. H.R.H. the Duke of Genoa entertained the members of the Congress at a reception in the Royal Palace.

On Friday, September 23rd, the Congress assembled at a general meeting in the grand hall. Presentations were made, and addresses were delivered. The three Sections met in special session. The subject of Cartography came under consideration in the first Section, and a variety of other matters. The subject of the Population of Different Regions, and Emigration, was continued. In the third Section Geographical Education was discussed. At night there was a reception at the Municipal Palace, jointly to the Geographical Congress and the Historical Congress, both of which were in session. The Syndic, Baron Podestà, took a prominent part in all the proceedings of the Congress.

On Saturday, September 24th, there was a general meeting of the Congress. Thanks were returned by the President to the representatives of foreign countries who had been present. Professor Pigorin then made his interesting communication on the Primitive Population of the Valley of the River Po, which was received with remarkable applause. The first Section held two meetings, and the second and third each met once, to wind up their affairs, and practically the Congress came to an end. At night there was a performance at the Carlo Felice Theatre of the opera of "Rigoletto." The members of both Congresses were present, and a reception, with refreshments for the members between the acts, was held in the Sala del Ridotto.

The Congresses were indebted to the hospitality of the Syndic, Baron Podestà, for this entertainment.

On Sunday, the 25th, there was a ceremony in the grand hall of the University, in the presence of H.R.H. the Duke of Genoa and a very large assembly of the general public, as many of the Congressists had left, in honour of the great navigator, Christopher Columbus. It had been arranged that a representative of each country and each learned society should have the opportunity of speaking for five minutes, in the alphabetical order of the country, in their native language. Professor Della Vedova, the secretary of the Congress and of the Italian Geographical Society, led the way with an interesting description of the difficulties overcome by the iron will of the great navigator. He was followed by eleven speakers; but unfortunately the newspapers of Genoa were unable to report in detail the eleven speeches. Signor de Carvalho, from Brazil, was the first in order; General Muktar Pasha, the delegate of Egypt, followed, partly in Arabic and partly in French; to him followed Professor Levasseur, of the French Geographical Society, in French; then came Professor Wagner, for Germany, in the German language; he was succeeded by Mr. Steinthal, in English, who expressed his admiration of the success of the Congress; and as Dr. George Smith, LL.D., the delegate from Edinburgh, had been compelled to leave Genoa, his place, by request, was taken by Miss Maria Cust, a member of the Congress, whose address, in the English language, was greeted with the applause of the assembly, and H.R.H. the Duke of Genoa, rising from his seat, shook hands with her before she sat down.

Professor Muller, for Holland, addressed the assembly in Dutch, and concluded his remarks in Italian. He was loudly applauded. To him succeeded Doctor Negruzzi, from Roumania, and General Semenov, the delegate of Russia, each in his native language; Colonel Julio Segui y Sala, the representative of Spain, in full uniform, followed with a magnificent oration in Spanish; Professor Eschliker spoke in the French language as the representative of Switzerland; and finally Signor Polleri closed the remarkable exhibition of sympathetic admiration by a speech in Spanish, as representative of Uruguay, in South America.

The Syndic, Baron Podestà, followed with a speech in French; and then the President of the Italian Geographical Society, the Marquess Doria, presented to the African explorer, Gaetano Casati, the gold medal of the year. H.R.H. the Duke of Genoa shook him by the hand, and congratulated him on the honour. The celebrated African missionary and scholar, Abbé Beltrame, then obtained leave to propose a message of good wishes to the Italian colony now settled on the Abyssinian sea-coast, and to its governor. This was voted by acclamation.

At 3 p.m. the final general meeting took place; the business was chiefly formal. It was:—The next Italian Congress should be held at Rome in 1894: votes of thanks were passed; the Countess Ouvaroff, representative of the Geographical Society in St. Petersburg, made a short speech in French to convey a vote of thanks to the President of the Congress. At night there was a banquet in the Sale del Ridotto, at the theatre, presided over by the Syndic of Genoa, who was the host to the two Congresses—Geographical and Historical; there were some excellent speeches. The usual toasts followed, and the next morning the Congressists dispersed.—[B. N. C.]

*Some Notes on Recent Exploration in British New Guinea.**

By COURTS TROTTER, Esq.

It has been suggested to me, in view of the great importance of the region, politically and geographically, both to Australia and to ourselves, that I should put before you—not for the first time, or, I am afraid, even for the second—a few notes on what has recently been done by us in British New Guinea; and although the last two years have produced no extensive geographical discoveries there, the information gained during journeys undertaken primarily for administrative purposes is by no means devoid of interest. How much remains to be done is evident from the mere fact that even along coasts previously visited many useful, and some first-class, harbours have been discovered. Of course an indented coast, with its indentations themselves protected by an outlying barrier of reef islands, affords harbours of exceptional security. Among such may be mentioned a splendid and absolutely land-locked harbour in Duan (Normanby), one of the largest of the d'Entrecasteaux group, 3 to 4 miles in diameter, the entrance of which had been quite concealed by a large island lying across its mouth, only leaving a passage into the harbour 100 yards in width. The remarkable harbour of Loosa Doudou, on the west of Orangerie Bay, about 2 miles by 1 mile, surrounded by wooded limestone hills, is completely sheltered in all weathers, and is perhaps the finest in the Possession. The inhabitants in the neighbourhood, and towards Milne Bay, formerly so threatening and warlike, are now peaceful and friendly, so that this harbour has now been thoroughly surveyed. The northern coast, however, from the German frontier downwards as far as Collingwood Bay, is perhaps the quarter most highly favoured in this respect. It is a very picturesque region, and its elevated promontories are the home of a numerous and healthy population. Thus, although much of the soil, e.g., towards Mitro Rock and the westward, is poor and rocky, and again about Dyke Acland Bay low and swampy, so that the agricultural value of the district is doubtful, it may offer favourable openings to trade.

A closer examination of this region seems for the first time to throw some light on the question of volcanic activity in New Guinea. This has hitherto been thought to be confined to islands on a line running parallel with the northern coasts; but on a recent occasion columns of steam were distinctly seen rising from two of the crests of Mount Victory, as well as from crevices and hollows in the surrounding ridges. The sides of the mountain are scored with brown lines, which Sir W. Macgregor thinks attributable not to lava streams, but to landslips, and connected with the earthquakes prevalent in the neighbourhood. It must be noted, however, that no flames were seen, that the natives in the immediate vicinity could give no information on the subject, and that the point from which the above phenomena were observed was estimated to be quite 12 or 15 miles distant.

It may be remembered that the only large area of comparatively level high lands as yet observed in the British territory was viewed in this direction by the party which ascended Mount Owen Stanley, and it was accordingly hoped that these tablelands might be accessible by means of some river-courses debouching in Collingwood or Helmeoto Bay. No such river mouths, however, were noticed by the recent survey, though it is not impossible that such may still be found among the mangrove swamps. Surveying on such coasts is a less simple matter than

* Paper read at the Edinburgh meeting of the British Association, August, 1892.

might be supposed, and the difficulty is often increased by the great shallowness of the water for many miles from the shore, a circumstance which sometimes makes it impossible for even the smallest boats to go in for fresh water.

An expedition which started from Phillips Harbour, in Collingwood Bay, to attempt the ascent of Mount Suckling, after covering a distance direct of some 25 miles, at first through swamps and afterwards through thick forest with a fair soil, reached an altitude of nearly 8000 feet on one of the spurs of this mountain, from whence a wide tract of rough and comparatively treeless country sloped up towards higher inland peaks. Above 6000 feet heavy rain occurred every night. This was in the month of July. The "Hornby" Range of the charts was seen not to be an independent range, but merely the spur of this central chain.

The very important question, with a direct practical bearing on the future development of the country by resident Europeans, viz., whether among the inner ranges there exist any considerable tracts of tableland with a certain elevation, seems, therefore, as far from solution as ever, and it may not be unworthy the consideration of geographers whether an efficient expedition could be sent out to settle this question.

The south coast beyond our western frontier has been visited; the country for the first 40 miles is an uninhabitable mangrove swamp; beyond that it improves, coco palms begin to alternate with mangroves, and population is found. Here is probably the home of the mysterious piratical Tugeri, a curious description of whom has recently appeared, by a self-appointed missionary named Montagu, who asserts that he has persuaded them to renounce their evil ways, and that our western districts, hitherto periodically ravaged by them, are, therefore, now safe. But it may be premature to accept all this.

Some addition has been made towards our knowledge of the great delta of the Fly River. A large stream, the Bamo, having a width of 1000 to 1500 yards, and a depth of $1\frac{1}{2}$ to 6 fathoms, enters the estuary of the Fly from the north, and its course was followed upwards for some 50 miles. The banks on both sides were in parts heavily timbered, with, in frequent alternation, large patches of sago palm, and considerable tracts of good cultivable land, liable, however, in parts, no doubt, to inundation. Strangely enough, however, though the population was pretty numerous, there was no sign that this land was ever under cultivation. Probably in this case the main staple of subsistence, besides the chase, is derived from the sago palm, the dependence on which is incidentally a great mark of savagery; for the tribes in question, being free from the labours of agriculture, can devote their time to raiding and plundering. The population of this district accordingly, though with few exceptions willing to trade, were found by Sir W. Macgregor equally willing to fight, and collisions were only avoided by consummate tact and coolness on his part. The only two villages where special difficulty was encountered were those which were fired into and plundered forty-five years ago by Captain Blackwood's ship, as related in Jukes's narrative, the tradition of the event being still fresh among the people. Sir W. Macgregor's experience here is only one of the many striking episodes with which his reports abound; a great fleet of canoes coming out to attack him, he manoeuvred so that only a few could directly face him, and the rest were prevented by their position from firing. Then, when within a few yards, the hostile leader, either overawed by Sir William's daring, or persuaded by his friendly gestures, and those of a gallant native ally, who stuck by him, suddenly laid aside his beheading knife and head-carrier, and the less ghastly bow and arrows, sprang ashore, and, arming himself with the green branch which is their token of friendship, at once turned war into peace. We can imagine the satisfaction with which Sir William, later

in the day, purchased from his new friends the curious implements intended to be used for his decapitation.

Eastwards from the Baimo as far as the Aird River and Cape Blackwood, the coast, which has practically been unvisited since Jukes's time, was carefully examined, and four considerable rivers ascended, the third of these (eastwards), the Turama, for some 80 miles, where it was still tidal, 60 yards across and 2 to 3 fathoms deep: a dangerous bore, rushing up twice a day from a funnel-shaped inlet at its mouth, is a serious hindrance to navigation. Some inaccuracies in Mr. Devan's map about the mouth of the Aird River are noted. On the Onati River, west of the Aird estuary, a curious case of contagious hysteria was seen. Several men were paddling a canoe. One of these fell down in convulsions; the others at first took no notice, but they gradually succumbed, and soon all but three had followed his example.

These rivers seem to rise in a hilly plateau of disintegrating limestone, but the district offers few facilities for planting, and is generally disappointing, for the shallow sea makes the coast difficult of approach, and in the south-east monsoon it would be practically inaccessible, especially to open boats, and on this coast as far as the Fly River they do not seem to use sails. The weather during this expedition (in March) was generally fair during the day, but almost always wet at night. Towards Cape Blackwood a Polynesian or East Papuan element in the place-names becomes marked, and the people were careful to explain that they are *Tugera-arubi*, i.e., apparently, of ancient descent, and settled, and not as the *oberi*, or bushman. A hostile reception was very frequent here, attributable, however, sometimes, only to rude animal spirits, and to be overcome by tact and patience; still, firearms had to be employed more than once. These savages are reported to have most gentle and musical voices.

But perhaps the most interesting piece of recent exploration deals with the last remaining unknown group of islands in the dependency of any importance, viz., the Trobriands, named after one of d'Entrecasteaux's commanders in 1793, the group being known, however, to the natives by the name of the principal island, Kiriwina. The group is of much greater extent and importance than has been supposed. It consists of about a dozen islands, of which two large and four or five smaller are inhabited, the population being estimated as certainly not less than 15,000. They are Papuan in style and language, but tinged by Polynesian influences; and, as often happens with the population of the outlying islands, are far beyond their neighbours on the mainland in intelligence; a circumstance due perhaps to an admixture of Malay or other foreign elements in the blood, or to an abundance of animal food. They are keen traders, and as such easily impressed with the advantages of peace. Many of them carried spears, but they declared that these were for sale, and that they were not in the habit of fighting. They are great smokers; and, as one of the chiefs observed, "If we were always fighting, how could we buy tobacco?" They show considerable artistic taste in the carving of their spears, shields, and various utensils, out of ebony and other hard woods. Bows and arrows, and the slings so common in the neighbouring Goodenough Island, seem unknown to them. Their houses, though small—usually some 8 to 10 feet by 6 feet, and 7 to 8 feet high, with a veranda, and a roof extending beyond the walls—are oval, and very substantially built, the walls being formed, of posts laid horizontally on each other. The fact that the tribes all speak one language makes greatly in favour of peace. The language has affinities with that of Murua (Woodlark), and even the more distant Fiji, on one side, and with that of Matupi (in New Britain) on the other. The Governor was received everywhere with great politeness, and the principal chief conducted him all over his quarters, which

included seventeen houses, each occupied by a separate wife, and most of these were to be seen sitting at their doors as he passed. At a little distance was the humbler establishment of the second chief, with the more modest allowance of five wives. Many of these ladies were old and far from prepossessing, but it seems that either from innate courtesy, or some more prudential reason, the Papuan always treats his older wives with more consideration than the younger. The people are all clothed, the women, in fact, possessing two petticoats, the one undyed, the second, used for dancing and other formal occasions, dyed, and worn over the other; and they made a point of never coming into the Governor's presence without this.

The islands are mostly of raised coral, the soil near the shore, consisting partly of vegetable mould, being the richest and deepest, and carrying often very fine timber. Further inland it is lighter, and only partially covers the coral rock; but this is the favourite planting-ground, and where the fragments of rock are collected in heaps, the intervening soil produces very fine crops of yams, and maize, which is much grown here. It is to the eastward of the main island, and between this and the large island of Murua, about 150 miles distant, that some islands of very interesting form occur, which appear to be raised atolls. From a sloping beach which surrounds the island (but which in some instances is washed away) rise precipitous cliffs 300 to 400 feet high, supporting a plateau which is cup-shaped, or depressed some 50 to 100 feet below the summits of the surrounding cliffs. It is thus entirely sheltered from the winds, and contains the numerous villages and homes of the islanders, which are all invisible from the outside, so that a passing vessel might suppose the island to be uninhabited. But this inhabited area is very fertile, for the rainfall is considerable, and filters away through the coral cliffs, so that fresh water is obtainable below by digging in the surrounding beach. The prosperous inhabitants, though living entirely on the plateau, also keep fishing vessels on the shore. At Kitava, the largest of these islands, and some 6 miles in circumference, Sir W. Macgregor was so hospitably received that his path was at times almost blocked by the offerings of food, mata, etc., which were laid before him.

A further investigation of the characters of the rock, both in the cliffs, and, if possible, in the base from which they spring, and of other features of these islands, is highly desirable. Whatever bearing this might have on the question of the formation of atolls generally, we seem at all events to have here an extension westwards of the area of elevation which includes the Solomon Islands, and which is dealt with so ably by Dr. Guppy in his description of that region.

The experiment now being made of introducing the first principles of law, order, and culture among a congeries of tribes, many of them absolutely savage, is full of interest, for the conditions are in many respects unprecedented. Philanthropists no doubt have before now tried their hands on barbarous races, but philanthropy has not often been backed by so much sound sense, combined with practical experience of the races to be dealt with. On the other hand, philanthropy, if at all disposed to run riot here, is checked by the urgent desirability of making both ends meet, and thus satisfying some natural, if slightly impatient, criticism. Bearing in mind the slender proportion of means to the end—a ruler with very limited revenues, and only a handful of Englishmen under him—(I say Englishmen, but the guiding spirit is, at all events, a Scotchman), on the one part, and on the other a population of isolated tribes roughly calculated at 350,000 in number, inhabiting a singularly difficult country as large as Great Britain,* the progress already made is remarkable.

* The area of British New Guinea is about 86,000 English square miles; of the whole island about 306,000 square miles.

One great difficulty in administering the country lies in the state of isolation and mutual hostility of these numerous tribes, and in the fact of their each speaking a different language. On the other hand, this greatly diminishes the risk of a native war on any large scale. It has often been stated that a different tribe with a new language is to be found at intervals of every few miles; there are, however, many exceptions to this. The Korian language, for instance, is spoken over some 200 to 300 square miles, in the country about the Iaroki Valley, and thence westward as far as the Goldie River. In all the islands of the Trobriand group, again, one language is spoken, and a closely allied tongue in Milne Bay, some 150 miles distant. The Motu language, adopted for general use at one time by the missionaries at Port Moresby, has also a considerable range of not less than 300 miles, while over extended coast tracts, as from Cloudy Bay eastward to Losen harbour—some 60 miles as the crow flies, and much further by the coast-line—and in the adjacent islands, and again between Mowatta and the Maikussa River, in the Papuan Gulf, the people all usually understand each other.

Another great hindrance is the absence, as a rule, of any person in authority through whom a tribe can be treated with. It may abstractedly be desirable that we should be all masses and no classes. But it may be inconvenient, and in the Pacific Islands, at all events, the absence of degrees of rank in any tribe indicates a very low stage of development, and is characteristic of the savage Papuan as compared with the refined and relatively civilized Polynesian. Accordingly, in the exceptional instances in this Papuan region where men of weight and influence are found, there are usually signs, both in physical type, and language, and manners, of an admixture of the more cultured race. Sometimes the chief is so by right of birth. Sometimes he is simply the strong man. In the Trobriands he is usually the *fattest* man; and there may be something to be said for this, for at any rate it shows that he is a man of substance, and that his food agrees with him; or, in more scientific terminology, is in harmony with its environment. It may be mentioned here that obesity is very rare among these people.

Contrary to what often obtains among savages, the Papuan women, though they work hard, enjoy great freedom and influence. It is remarked, indeed, that in the tribes with Polynesian affinities they have less to say. But perhaps they only say it more quietly. A peculiar difficulty has of late arisen in the fact that, while the coast tribes are comparatively accessible to us, their neighbours beyond them are not so. The former, as a rule, have not been slow to perceive our intentions, and to appreciate the establishment of a Pax Britannica. Some, indeed, of the more powerful among them, not understanding our strength, determined to try conclusions with us; but being unsuccessful, and finding themselves nevertheless treated with lenity, cordially gave in, and are now among our best supporters. But wildness is everywhere combined with firmness. If a tribe defies us, and tries to excite its neighbours against us, the village is as soon as possible visited in force, and as the inhabitants usually fly, their prestige is broken once for all. At the worst, if they have committed actual violence the houses are entered, their arms collected, and burned in the village square, but no houses are burned, or mischief done. On one occasion a chief having taken up a bellicose attitude, the leader of the little party of native constabulary borrowed his shield, and hanging it up, made his men fire a volley at it. The result was that valour was swayed by discretion, and peace at once offered and accepted. This seems a small matter, but it is typical of the régime followed throughout.

The lesser tribes, who had long suffered from the exactions and violence of their more powerful neighbours (which here means being occasionally killed and eaten, as well as systematically plundered), have naturally appreciated the new position more

readily. But now the difficulty arises. They have under our influence disarmed, and have even voluntarily pulled down the stockades of their villages, and thereby laid themselves open to attack by their inland neighbours, against whom it is as yet very difficult for us to protect them. And these inland tribes, who in some instances are coast tribes who have been dispossessed and driven inland by more powerful neighbours, seem often to be desperate savages. Even they, however, are beginning to send emissaries down to the coast to inquire what this new thing "Government" may mean.

One curious result of the new régime is, that sometimes a tribe, after discussing the merits of our protectorate, is unable to agree about it; accordingly, the more conservative, who think things are going too fast, or those for whom opposition in the abstract has more attraction, remain in the old quarters, while the more advanced party takes up new land and establishes its penates within easier reach of our strong arm.

There are other striking signs of the new order of things. Villages formerly built for safety upon piles over the water are now being rebuilt on dry land, and the new houses are far more substantial. Additional land is taken into cultivation, or coconuts planted for sale, in the faith that the sower will reap his fruits in security. Over great tracts of coast, and for some way inland, the people who invariably carried arms now appear without them; and whereas they never crossed their own marches in peace, they now visit freely, and pass the night among those who, three years ago, were their deadly enemies.

As regards the administration of the law, there has naturally been much difficulty in explaining that a crime will only be visited on the individual criminal, and not, according to native usage, on the village or tribe. But now, when it is made evident to the offender's tribe that they will not be molested if he is given up, they generally cease to shelter him; though sometimes when he is taken his relations beg to be allowed to accompany him, thereby showing at once their confidence in the white man's justice, and their own strong family affection. Indeed, even when tribesmen have been arrested and taken away as hostages for the delivery of a murderer, they have understood the proceeding; and though the family of a murdered man would prefer to possess themselves of a few heads from the other side rather than merely witness the murderer's execution, they learn to acquiesce in our tamer arrangements.

Crime of course must be dealt with, even when arising simply out of native custom or belief. Thus, a tribe on Kivai Island, the Sumai, pay a visit to their neighbours the Domori. Soon after their return home a Sumai man dies. It is put down to witchcraft, and a party returns to Domori to avenge him. The Domori chief comes forward, asserts innocence, points, moreover, to his shirt as proof of his connection with "Government." The Sumai for answer bends his bow, and, expressing contempt for the Government, sends his arrow right through both shirt and wearer (a common feat among these Strongbows!). But by-and-by the Governor appears on the scene in force. The culprits are overawed, and decline to fight; but the Governor says it is necessary to do so to prove which is the stronger, and that he is ready to begin at once. Then the offenders collapse, the native missionary who had tried to dissuade them from violence is promoted to honour, and a church and school built in atonement.

Fortune does not favour the Kivai people. They are hard-working, intelligent, and well-behaved, but their land, besides being limited in extent, is little better than a swamp, and the sea is encroaching on it.

The changes above described are observable not merely at comparatively familiar places on the south coast, but in the d'Entrecasteaux Islands, so much more

recently brought within the sphere of our activity, and hitherto exceptionally savage. At Dunn (Normanby Island), cultivation is rapidly increasing, the drawback of the great steepness of the hill-slopes being counterbalanced by the valuable heavy rainfall. The island is now frequented by large trading canoes in search of food supplies, and all unarmed, a thing hitherto unknown. Again, over long tracts of coast shipwrecked sailors can even now count on meeting with help and protection. But perhaps the most remarkable proof of advance has been the successful training in police duties of men who, three years ago, were absolute savages. It is even expected that boys now at school who show exceptional abilities may be employed in office-work.

As might be expected, we find very different qualities among these isolated tribes. Some are bolder and fiercer than others, or more treacherous. In this last quality, combined with cowardice, some of the Louisiade islanders have a bad pre-eminence, though some of the islands show bright exceptions. But all at first show timidity and mistrust, startled like wild animals by a sudden movement, and dispersing almost beyond recall by the striking of a lucifer match or the sight of a mirror; and naturally enough all this is intensified at spots known to have been the scene of kidnapping atrocities. But who can blame their timidity? if, indeed, it can be so called. Could greater daring possibly be exhibited than that of a native who, encountering a steamboat for the first time, paddles up to the puffing, smoking monster, and ventures on board?

But here a grave question arises. This beneficent but rapid introduction of civilisation, of peace and order, entailing an equally sudden removal of the health-giving stimuli of fighting and raiding, as well as of responsibility and independent action—will the race be able to stand the shock of such a revolution in all its ideas and ways? It will no doubt be improved. Will it not be improved off the face of the earth? Our experiences elsewhere do not enable us to give so clear an answer to this question as we could wish.

As in character, so also in habits and customs, there are great differences. Most of them are fond of tobacco, but some are ignorant of it, or indifferent. At very few places has the use of kava as a beverage been noticed, and the elaborate ceremonial which accompanies the practice in the Pacific Islands is here altogether absent. As regards arms, the spear and shield in one place, the bow and arrow in another, are in exclusive use, and it has been noticed that the tribes which are armed with bow and arrow do not carry a shield, but only a stick, with which they profess to ward off arrows or spears. There are still some places where iron is unknown, and where its advantages, as compared with the native implements of basalt or jade, are by no means readily perceived or admitted. They will sometimes exchange these for a few beads, but not for steel hatchets. Jade has as yet only been observed at Cloudy Bay on the south coast, and in the immediately opposite districts on the north coast about the head of Collingwood Bay, and in Holnicote Bay, where it begins to be replaced by basalt, from which it is argued that it is found (as indeed the natives report) in the intervening ranges known as Mount Suckling. It is remarkably tough, the tools taking a very fine edge, which is not readily chipped or splintered. It appears to be mineralogically almost identical with the jade of New Zealand, containing perhaps some proportion of serpentine, with a somewhat higher specific gravity due to the presence of iron.

Among other quaint customs not hitherto observed was that of a deputation which came to intercede for a criminal, and was preceded by a man carrying a bamboo plant, to the broken branches of which were attached the plumes of birds-of-paradise, and pieces of ornamental feather-work.

Sir W. Macgregor speaks of the two main characteristics of the race as

covetousness, and absence of religious feeling. As regards this last charge, it is one so frequently brought against savages that only his great experience would lead us to attach much weight to it in this instance. The Papuan in Eastern New Guinea, however, warmly welcomes the missionary. But the welcome is no doubt quite unconnected with any spiritual aspirations, and he probably associates the missionary with improved opportunities for trade or peaceful plunder, or at best with greater general security. His greediness and desire for gain, so different from the easy-going communism of Polynesia, may, it is to be hoped, stimulate him to plant and trade, and thereby tend to develop the resources of the country, and to bring about that much-desired end, a budget equilibrium. We ought not to despair of this, remembering the considerable amount of trade intercourse that existed before our connection with New Guinea, the fleets of great canoes, several sailing bound together, trafficking the cargo of one district for the pottery and artistic ornaments and implements of another. Certain villages or islands, too, have long been famous as boat-builders, and purchasers resort to them from long distances. Indeed, the amount of such intercourse, and still more, the specialisation of produce of certain districts, may well modify our usual conception of "savage" life. But the question, "What is a savage?" is not one to be answered offhand.

It is interesting to note here, as showing the transitional state of affairs, that while the canoe-builders, e.g., at Pannaet, in the Louisiades, work with adzes made of hoop-iron, the payment for their work is made in stone axes, ten to fifty of these being the price of a canoe. The stone axe is still the accepted medium of exchange in large transactions—pigs, for instance, and wives, are valued in that currency. It is only fair, by the way, to mention that the purchase of a wife is stated by the natives not to be such in the ordinary sense; the articles paid are, they say, a present to the girl's father. In Mowatta, sisters are specially valued, as they can be interchanged with other men's sisters as wives.

But how soon this desirable equilibrium in the finances will be attained is far from clear. There is probably much in the economic condition of things which is hardly yet understood. Thus, in some parts, as in the elevated coast tracts towards the German frontier, and more especially in Moratau and some neighbouring islands, the population seems to be even too dense, while elsewhere large level tracts near the coast, or in the deltas of rivers, seem—why, is not evident, even if they are flooded at certain seasons—unoccupied. Many of the smaller islands, e.g., in the d'Entrecasteaux and Trobriand groups, though evidently capable of cultivation, are unoccupied. These, when found, have been declared Crown property, so that they may be leased, or developed by the Government, as occasion may dictate.

There is still room for a great amount of coconut planting, which yields a sure return, and it is even suggested to make the planting yearly of a certain number of nuts compulsory on a village. It is always hoped, too, that new staples may be discovered. The prominence of trees of the *Ficus* order, and of the *Euphorbiaceae*, make it not improbable that india-rubber and gutta-percha, respectively, may be forthcoming. The large number of fibre-producing orders again—*Hibiscus*, *Tiliaceae*, *Urticaceae*, *Pandanus*, and others—point to the existence of valuable fibres. A curious possible item of export was discovered in the island of Rous (Ross), in the Louisiades. Here, in one of the least advanced tribes in the Possession, it was observed that every man carried about him a piece of sponge for the purpose of washing his face!—and these sponges, found in the adjacent sea, are of remarkably fine quality. There remains always a possibility of the discovery of a rich goldfield, but the miners, who have now been steadily at work for some years in the Louisiades Islands, do not seem to make more than a bare living. The excellent terms on which they live with the natives are very creditable to both parties. In

Moratau (Fergusson Island) the confidence now established will make it possible to work the deposits of sulphur and alum discovered there.

The administrator is anxious to encourage the *bona fide* settlement of white men, planters and others, though he does not feel justified in alienating large tracts of land, partly because it is still doubtful how far any such exist which are not in partial use by the native population, and also because the purchase of such tracts from the natives, however fairly, and with whatever precautions, might lead to collisions and disturbances which he is without the means to deal with, and which would entail expenses which those on whom he is financially dependent would be most unlikely to sanction.

It appears to me that there is every reason to be satisfied with the lines on which he has chosen to work this—as I have called it—most interesting experiment, and with the skill he has shown in conducting it. Certainly we are doing at least as well as either of the other joint occupiers of New Guinea, the Dutch and the Germans; for the attempt of the latter to work their territory on commercial principles can certainly not as yet be called a success; while the Dutch, with unlimited sources on which to draw for labour, and abundant experience, have, after long years of possession, done nothing at all.* Obviously, for such a work as Sir W. Macgregor is doing, time is wanted, and patience. It is a very noble work, and must have the sympathy of all those among us who retain the instincts of an imperial race.

GEOGRAPHICAL NOTES.

The New Session.—Attention is drawn to the programme of the new Session, which is inserted in the present number of the 'Proceedings.' Any additions or modifications will be intimated under the head of "Notices to Fellows," on the cover of future numbers of the 'Proceedings.'

Death of Karl von Spruner.—Only a few months after the death of Dr. Theodor Menke, to whom we owe the third edition of Spruner's 'Historical Atlas,' we have to record the death of the author of this great work, Dr. Karl Spruner von Merz, General of the Bavarian Infantry, who died on August 24th, at the age of 89. He entered the army in 1825, the General Staff in 1857, and in 1864 became Lieutenant-General, and the King of Bavaria's Adjutant-General. His connection with Perthes' Geographical Institute dates from the beginning of the thirties, and he was thus a contemporary of Adolf Stieler and Heinrich Berghaus. The publication of his 'Historisch Geographischer Hand Atlas' was commenced in 1837, and completed in 1852. The two principles he kept constantly before him in the execution of this great work were, that a good historical map should show for the period to which it refers just what we expect a good geographical map to show for the present day, and further, that the compiler of an historical atlas has as much need to

* We must always remember the object with which this territory was annexed. It was with no thought of making money, but merely with the view of preventing the command of Torres Straits from falling into other hands.

study original authorities as the author of an historical book. Spruner was also the author of two school atlases of historical geography, and of several historical dramas, which latter may not, however, be mentioned here.

The Columbus Celebrations.—During the month of October the fourth centenary of the discovery of America by Columbus has been celebrated in all parts of the world; and most of the important geographical journals have devoted a great deal of space to the literature of the question. We have already noted most of the forms which the celebrations were intended to take, and now have only to refer briefly to the mode in which the various programmes have been carried out. The greatest interest centres in the series of splendid fêtes which have been held at Huelva, to celebrate the landing of Columbus, in succession to those already referred to (p. 700), which commemorated his sailing from that port. The Congress of Americanists was held at La Rabida, in the monastery where Columbus perfected the plans for his adventure, the cloisters having recently been restored as nearly as possible to their state 400 years ago. The Congress, after discussing various questions mainly relating to South America, was closed by the Queen-Regent in person on the 11th, a special meeting being arranged to take place at Chicago next year. The Queen and the young King were present on the following day at a great religious service in the monastery; after which a commemorative column, erected by the Spanish Government at a cost of £15,000, was solemnly inaugurated. The arrival of the Queen at Huelva on the 10th was the occasion of a very brilliant reception, the *Conde de Venadito*, in which the royal party sailed from Cadiz, being accompanied by representatives from the navies of all the maritime nations. The frigate *Santa Maria* (see p. 700), and *fac-similes* of the vessels which accompanied Columbus—the *Pinta* and *Nina*—took part in the manoeuvres. The two latter vessels have been built in Spain, but belong to the United States; and all three will proceed to the Chicago Exhibition. On the 11th the King and Queen-Regent made their official entry into Huelva, and after a reception by the municipal authorities were spectators of a fine allegorical procession, in which a number of quaintly-designed cars took part. The weather throughout was magnificent. In the absence of any of the delegates appointed by the Council, our Society was well represented at Huelva by its Honorary Corresponding Member, Colonel Francisco Coello. In all the large towns of Spain celebrations were held, those at Seville, Barcelona, and Valladolid being the most brilliant. At Madrid an Exhibition has been open for some time, and in the latter half of October a Hispâno-Portuguese-American Congress was held. In New York the most elaborate of the American Columbus fêtes took place on October 12th, all business being brought to a standstill. There

was a preliminary naval display in the harbour on the previous day; but the military parade of 40,000 troops, which is said to have been witnessed by more than 2,000,000 spectators, was the central feature. A statue of Columbus brought from Italy was unveiled in the Central Park. Special meetings were held in the capitals and principal towns of most European countries on the 12th. That in London took the form of a banquet in the Hotel Métropole, presided over by the Spanish Ambassador. On the 21st the grandest memorial of all—the great Chicago Exhibition—was formally dedicated. Here, appropriately assembled in the largest structure which has ever been erected, a multitude of 100,000 persons took part in the dedication ceremony, the inaugural odes being sung by a choir of 5000 voices. The central feature of the ceremonial was an address by Mr. Chauncy Depew, in the most typical style of impassioned American oratory. He traced the effect of the discovery by Columbus on the advance of civilisation, finding in it the origin of political liberty and material progress.

The Thames as an Agent in Plant Dispersal.—Perhaps no river would seem less promising than the Thames for the purpose of studying the geographical dispersal of special floras, but Dr. H. B. Guppy, in a paper read recently to the Linnæan Society, has obtained from it a number of important observations. He made frequent examinations of the floating drift in the Thames, the Lea, and the Roding, and found that in spite of the heavy autumnal floods the vegetable matter was not swept out to sea, but remained in sheltered curves until the spring months, when the seeds germinated. Dr. Guppy collected the floating river scum at selected points by means of a tow-net, and then worked over the material at home, picking out the seeds or seed-vessels of various species, and when these could not be identified, sowing the seed and raising the plant. Distinct differences were observed between the plant species commonest in the Thames and the Lea. Ice was found to be a very important means of dispersing seeds, the surface drift getting frozen in as the ice formed, and on a thaw occurring, being carried a long distance before it melted. Most of the seeds common in the Thames will float for months in sea-water without losing the power of germinating. Floating seeds usually belong to land plants; water plants proper have usually heavy seeds, which sink, and are only found in the mud. The result of the investigation was to show that many plants must owe their wide dispersal to birds and not to water transport.

The Weissen-See.—Dr. Karl Grissinger has recently made a careful and complete study of the Weissen-See, in Carinthia, an account of which was published in a recent number of 'Petermann's Mittheilungen,' with a bathymetrical chart and an ingenious diagram illustrating temperature changes in the water. The lake was the only one of any size in the eastern Alps that had not been fully sounded by Richter or others. It

belongs to the Drave valley, and lies at an elevation of 980 feet above the river, and 3000 feet above sea-level. It is a narrow lake, extending from east to west, $7\frac{1}{2}$ miles long, 1000 yards wide at the widest part, and 160 yards at a constriction, which divides it into two unequal parts. Its total area, despite its length, is only $2\frac{1}{2}$ square miles—a much less disparity, however, than occurs in the somewhat similar basin of Loch Eck, in Argyllshire. A special modification of the wire sounding-machine was used to ascertain the depth, and 18 cross-lines of soundings were taken, from which a contoured chart was constructed. Notwithstanding the superficial division into two parts, the lake consists practically of one basin, deepening very gradually from the west end to a maximum of 53 fathoms at three-quarters of the distance to the outlet, and then shoaling rapidly. Almost one-half of the area is less than 11 fathoms in depth, and the mean depth of the whole lake is $19\frac{1}{2}$ fathoms. In outline, direction, configuration, and depth, the Weissen-See is, on a somewhat reduced scale, precisely similar to Loch Rannoch, in Perthshire (see 'Scottish Geographical Magazine' (1888), p. 258, map), and conforms to the type of alpine rock-basins. While sounding the lake during the first few days of September, 1891, Dr. Grissinger made a number of observations of temperature by means of a Casella maximum-and-minimum thermometer, which was presumably protected against pressure, although this is not stated. On account of its great elevation the lake is covered with 20 inches thickness of ice for four months of the year, thus falling under Forel's class of "Temperate Lakes" ('Comptes Rendus,' 1889, p. 587). Temperature soundings were made three or four times a day for four days. The temperature, varying from $65^{\circ}\cdot5$ to 71° on the surface, diminished very gradually to about 63° at 4 fathoms, then abruptly to 47° at 7 fathoms, again gradually to 40° at 16 fathoms, from which depth there was no further change to the bottom. The interest of the observations lies in the fact that in the morning the layer of low constant temperature did not begin until a considerably greater depth than was the case in the afternoon, the warming effect of the previous day requiring some time to penetrate. The superficial layer closely followed the variations of air-temperature throughout the day, with a maximum about noon. At depths of from 3 to 6 fathoms the period of maximum was retarded until afternoon, and the range of temperature reduced. From 13 to 17 fathoms the maximum was retarded until the following forenoon, and at 18 fathoms no trace of daily variation was to be found. While the diurnal range on the surface was nearly 4° , that at a depth of from 1 to 8 fathoms was $0^{\circ}\cdot8$, and from 9 to 17 fathoms, less than $0^{\circ}\cdot2$. The diagram showing the successive temperature changes at all depths for five consecutive days would have been much more instructive if at least one set of observations could have been taken after dark, and it is probable that more exact results would have been obtained if Negretti and Zambra's reversing

thermometers in a suitable frame had been employed, as in the investigation of temperature changes in the Scottish lochs by Mr. Buchanan, Dr. Murray, and others. But taking into account the instrumental difficulties presented by the use of a slow-acting thermometer, Dr. Grissinger's results are highly creditable to him, and will take a permanent place in the records of diurnal variation of temperature beneath the surface.

The Flora of Northern Germany during the Middle Ages.—We extract the following notes from an interesting paper by Dr. E. H. L. Krause on the Flora of Northern Germany in the Middle Ages, which appears, with a map, in the current number of 'Petermann's Mittheilungen.' The author deals mainly with the period from the twelfth to the beginning of the sixteenth century—the materials relating to earlier periods being very scanty—and concerns himself only with the vegetation of uncultivated lands. North-west Germany was in the Middle Ages rich in forests. In Saxony there was less forest in the sixteenth century than from the twelfth to the fifteenth centuries. In Oldenburg to-day there are oaks and beeches estimated to be over 500 years old, notably in the so-called virgin forest of the Varel district. The general character of the forests of Schleswig-Holstein in the Middle Ages was deciduous, with a predominance of oaks and beeches, pines being absent. The West Baltic coast was from the eighth till the twelfth century little inhabited, and remained thickly wooded, the forests being much less broken up by heaths and moors than those of North-west Germany. The central mountains of Western Germany were also well covered with forests. The heights in the basin of the Moselle, which had been cleared of trees by the Romans, were, shortly after the occupation of the country by the Franks, again clothed with forests. Turning to the three central provinces of Thuringia, we find that the heights to the north and south of the Harz Mountains were wooded, and besides oaks and beeches, aspens and birches were very common. The flora of the Sarmatian lowlands stood in striking contrast to that of the western provinces. In the former, pinewoods were everywhere abundant, the Scotch pine being in many places the most common tree. In this region the western limit of the pine forests appears to have been in some measure coincident with the boundary between the Slav and Low German populations. On the East Baltic coasts the red pine was more common, and beeches almost entirely disappeared. The higher mountain ranges were characterised by the presence on their lower slopes of the silver-leaved fir. This tree has completely disappeared in the Harz Mountains. It is doubtful whether this species of fir flourished in the highlands of Poland in the Middle Ages. Dr. Krause's paper forms a valuable contribution to the historical study of the geographical distribution of plants, and his map is carefully worked out.

Railways in Syria.—The *Revue Française* gives a short account of the new railway between Jaffa and Jerusalem, which was opened for traffic in September last. The line is 54 miles long, and has been completed in a little over two years by a French company, who have a concession for 71 years. The distance, including stoppages, will be run by ordinary trains in three hours. On leaving Jaffa the line first traverses the orange plantations, and runs eastward and southward through Lydda, Ramleh, El Mansura, Sejed, Deir-Aban, and Bittir, at all of which there are stations. The population of Jerusalem is now about 80,000, having doubled within the last ten years. It is ultimately intended to build branches from Ramleh northward to Naplus and possibly Damascus, and southward to Gaza and the Egyptian frontier. In a recent report the British Consul at Damascus describes the plans for three new railways in that region. Work has already been commenced on a line from Damascus southward to the grain-growing plateau of the Hauran, a distance of 70 miles, of which 20 miles were completed in August. In connection with this a narrow-gauge line is projected from Damascus to Beirut, on which considerable engineering difficulties would have to be overcome. These lines are promoted by a Belgian and a French company respectively, in opposition to a third projected railway, financed by British capitalists, which is intended to be carried from Kaiffa and Acre to Damascus and the Hauran on the ordinary gauge. On this line the physical conditions are more favourable, the only effort of engineering required being the crossing of the Jordan valley.

Pevtsof's Expedition to Tibet.—We have received from St. Petersburg the second part of the report of Pevtsof's expedition to Tibet. This contains the narrative of the earlier part of the expedition (chap. 1), an orographical sketch of North-Western Tibet (chap. 2), and geological notices (chaps. 3, 4, and 5), by K. Bogdanovich, the geologist attached to the expedition. The work is published by the Russian Geographical Society, and contains maps and illustrations of great interest, supplying as they do details on the topography and geology of very little-known regions. Thus, we have route-surveys from Yangli-Hissar to the Mustagh-ata Group (highest peak 25,900 feet), almost due west of Yarkand; another route-survey to the upper waters of the Yarkaud-daria; a third from Keria to the jade mines, in the Ak-kar Range of the Kuen Luen, situate not far from a group of mountains named by the late Prejevalsky "Tsar Liberator," the *Liush-tagh* of Bogdanovich's survey, with a continuation to the Karangu-tagh Mountains and to Khotan; a fourth from Niya to the gold-mines of Sourgak and the shrine of Injelik Khanum; a fifth from Kara-sai to the Kopa goldfield and Dalai-Kugan, in one of the ramifications of the Kuen Luen, besides

geological sections. The chief interest of the part is geological, M. Bogdanovich being the first geologist to investigate the strata in any detail.—[E. D. M.]

The Canary Islands.—The latest Foreign Office report on Spain contains a comprehensive pamphlet on the social and economical conditions of the Canary Islands, by Mr. Samler Brown. About 1490 the Canaries were partly planted with sugar and large profits realised, until, in the sixteenth century, the islands were unable longer to compete with the West Indies. Recently a fresh start has been made by means of British capital; and now there are several steam factories in Grand Canary and one in Teneriffe. From 1490 to 1850 the vine thrived on the islands, but at the latter date it was destroyed by the ravages of a fungus; the European had to be replaced by American vines, and the quality of wine has greatly deteriorated. The trade, however, has rapidly revived since 1885, and the vine will probably again become the most important of all the products of the country. Cochineal was originally brought to the Canaries in 1826, and after some prejudice had been overcome it was found that the dye was produced more plentifully and of better quality than in other countries. The discovery of aniline dyes brought about a crisis, and the export of cochineal has rapidly decreased. The attempt to replace cochineal by tobacco has proved a failure. The land is now largely planted with tomatoes, bananas, and oranges, and the Canaries are becoming a market garden for Northern Europe, earlier by several weeks than the Channel Islands. The steepness with which the coast lands rise upwards to the hills occasions a succession of zones differing in temperature, nature of soil, and other conditions. There are five climatic zones, the limit of cultivation rarely exceeding 4000 feet. The forest land begins at an elevation of about 3000 feet, and the greatest height at which any shrub is found is about 11,000 feet. The Spanish Government has ordered the planting of young trees, and prohibited the previous reckless waste. There is no record of freezing-point being touched at Laguna, 1840 feet, the highest point at which regular meteorological observations have been taken for a series of years. At Vila Flor, 4335 feet, the lowest temperature recorded was 28°. The highest summer record was 104° at Laguna; the ordinary summer temperature in towns by the sea averages 82°. The annual rainfall at Las Palmas is 8.35 inches, in Laguna 29.41. In the western islands droughts are unusual, but in the eastern, specially in Fuerteventura, great distress is occasioned. The islands of Hierro and Fuerteventura have no springs, and Langanote has very few. These depend simply on the dew and rainfall. Grand Canary possesses by far the best water supply; Teneriffe could profitably use for irrigation ten times as much water as is available. The water is carried from the springs in watercourses of stone, and by

evaporation, leakage, or robbery, a large percentage is lost. An estimate for 1869 states that all the cultivated land, including woods, vineyards, and pasturage, amounted to 845 square miles; in 1890 the total amount of irrigated land in Teneriffe and Grand Canary was 15,000 acres. The deep water between the shallow banks on the West African coast and the Canary Islands affords one of the best fishing-grounds in the world. The kind of cod caught is said to be superior to that got on the Newfoundland bank; while there are tunny, porpoises, sea-bream, and many other species of fish. The fisheries have never been properly worked, and are now carried on in a very half-hearted fashion.

Railways in West Africa.—From the Consular report on the trade of Loanda for 1891 we learn that the Royal Trans-African Railway from Loanda to Ambaca has now been opened to a distance of about 140 miles. At present it is of little service to the mercantile community, as until it reaches Casengo, the centre of the coffee district, its course is through a barren country. The carriage of coffee from Casengo to Loanda, under present conditions, is at the rate of £7 per ton; when the railway is completed, as it soon will be, the carriage will not cost much more than half that amount. The passenger traffic is large, and a surprising number of natives travel. Exceptionally heavy rains have done much damage to the railway works, and some years may elapse before the line is completed up to Ambaca. Great improvements are anticipated during the next few years, which will probably show that money which has been wasted upon the east coast would have produced a satisfactory return on the west coast, the greater possibilities of which have been comparatively neglected.

The Chanler and Von Hühnel Expedition to East Africa.—A letter has been received from Mr. Chanler, dated September 12th, in which he states that he was then at Mkonumbi, near Lamu, and was just about to start for the interior. His party consists of 160 porters, 12 Somali camel-drivers, 15 camels, 50 donkeys, 2 horses, cattle, sheep, and goats. He was accompanied by Lieutenant von Hühnel and the servant who had been with him on his former journey. The route he intended to follow was along the north bank of the Tana as far as Hamaye, from thence to the northern slopes of Mount Kenia, of which mountain he will attempt the ascent. On leaving Mount Kenia it is intended to complete the survey of the course of the Guaso Nyiro and explore the Lorian Lakes; thence to the north until the confines of Kaffa are reached. During this portion of the journey it is intended to explore the courses of the Bass and Omo Nianam Rivers. Having completed this, the party will travel eastward with the intention of reaching the Somali coast somewhere between Magdishu and Kismayu. While at Mkonumbi the position of that place was found by astronomical

observation to be lat. $2^{\circ} 18' 45''$ S., long. $40^{\circ} 43' 0''$ E., which agrees very closely with the position assigned to it on Mr. Ravenstein's map of "Part of Eastern Africa," prepared by authority of the Imperial British East Africa Company.

Dr. Baumann in Central Africa.—Since his arrival at Kadoto, on the eastern shores of Lake Victoria Nyanza, Dr. Baumann has made a boat excursion to the German station of Mwanga, on the southern shore of Speke Gulf. He has found, by soundings, that the lake here is quite navigable for vessels with a draught of $6\frac{1}{2}$ feet. In the vicinity of Kadoto the mouth of the Ruwara River naturally causes a silting up of sand. Up to a distance of 550 yards from the shore the water maintains an average depth of 8 feet; then follows a stretch of from $1\frac{1}{2}$ to nearly 2 miles, with a depth of from $5\frac{1}{2}$ to $6\frac{1}{2}$ feet, and afterwards the greater depths of from 13 to 20 feet. Dr. Baumann intended to make a circular journey through the countries bordering on the eastern shore of the lake.

A Visit to Lake Yzabal (Guatemala).—In the autumn of 1890 Dr. Karl Sapper paid a visit to the beautiful Lake Yzabal (Laguna Dulce), which lies close to the east coast of Guatemala. He gives a short account of his excursion in No. 10 of Petermann's 'Mitteilungen.' He approached the lake from the west, passing through Panzoz and then along the southern side of the River Polochic, through the dense forest which stretches from that town to the lake itself. Scattered here and there are small clearings, with a sparse population of Indians. The larger animals are poorly represented in the plains of the Polochic River, but insects are numerous. A feature of the luxuriant vegetation is the mighty corozo palm, with its leaves often nearly 40 feet in length. The lake is about 31 miles long and 12 miles broad. The town of Yzabal is a sleepy little place. Three times a week a small steamer plies between it and Livingstone. The trade with the interior along the bridge-path has dwindled down very much, and is almost entirely confined to the local requirements of the immediate vicinity. The land along the shores of the lake is well suited for tropical agriculture and for cattle-rearing. Owing, however, to the malarial climate, there is not much prospect of development for the place. Dr. Sapper discusses at some length the question whether the shores of the lake were in early times as solitary and thinly populated as they are to-day. It is evident that, when Cortes visited the lake early in the sixteenth century, conditions were much the same as now; and it is supposed that the numerous population, reported by the Spaniards on their first visit to this region, must have retreated at once into the interior from fear of the new-comers.

Height of Mount Orizaba.—Mr. J. T. Scovell has a short article in the 'American Naturalist' for October on the height of the Star Mountain,

Orizaba, or Citlaltepētli, as it is variously termed. Previous estimates and barometric measurements differ considerably. Humboldt gave it as 17,375 feet, a Mexican scientific commission as 17,664, Ferrer as 17,879, Abmaran, 17,916, A. Heilprin, 18,205, and Franz Kaska, 18,270. Heilprin's estimate was based on simultaneous readings of an aneroid on the summit and a standard mercurial barometer in the city of Mexico, 125 miles away; Kaska's by mercurial standards on the summit and at Chalchicomula, 20 miles distant, the height of the latter being fixed by railway levels. In July, 1891, Mr. Scovell, assisted by Mr. O. G. Bunsen, carried a line of spirit levels from Kaska's datum to a height of 14,000 feet above the sea. From this point careful aneroid observations showed the summit to be 4179 feet higher, or at an altitude of 18,179 feet—a result closely corresponding to Heilprin's. In April, 1892, Mr. Scovell measured a base-line 1550 feet long near the 13,000-foot level, and took angles to a large cross fixed on the summit, the resulting height coming out as 18,312 feet. The elevation of Orizaba may thus be taken as about 18,300 feet, exceeding Mount St. Elias (Russell's estimate of 1891) by 200 feet, and Popocatepetl by about 700 feet, and the mountain must be considered the culminating point of the North American continent.

Obituary.

John MacGregor.—Mr. John MacGregor, whose fascinating descriptions of solitary journeys in the yawl and canoe *Rob Roy* have proved amongst the most popular of modern travels, was born at Gravesend on January 26th, 1825. His adventurous career commenced early, for when he was only a few weeks old he set sail with his father, afterwards General Sir Duncan MacGregor, and mother, on the ill-fated *Kent* East Indiaman, which was burnt at sea in the Bay of Biscay. His early education was carried on in a fragmentary manner on account of his father's frequent change of place with the regiment. Later he studied at Trinity College, Dublin, and then entered Trinity College, Cambridge, where he graduated and took a place as a Wrangler. In 1847 he took his M.A. degree at Cambridge and entered the Inner Temple. Before he was called to the Bar, in 1851, he travelled extensively in Europe and the Levant, being in Paris during the Revolution of 1848, and subsequently finding his way as far as Palestine and Egypt. His restless spirit kept him continually in motion; he left no country in Europe unvisited, going as far as Russia on the east, and crossing to Algeria and Tunis on the south. Then he travelled through the United States and Canada, writing a book descriptive of what he saw. In 1855 he set the fashion of canoeing, and the "chips from his log," published in the following year under the title, '*A Thousand Miles in the Rob Roy Canoe on the Rivers and Lakes of Europe*,' became extremely popular. The Canoe Club was founded, of which he was long the captain. Subsequent solitary voyages of a more adventurous kind were recorded in the '*Rob Roy on the Baltic*,' published in 1867; the '*Voyage Alone in the Yawl Rob Roy*,' in 1868, a trip in which he proved himself as thorough a master of the sail as of the paddle; and the '*Rob Roy on the Jordan*,' in 1869, perhaps the most interesting and best known of his journeys. Mr. MacGregor occupied himself with more serious

pursuits as well. On two occasions he served as a member of the London School Board, and he had always the cause of education much at heart. The various training-ships were special objects of attention, and he devoted the profits of at least one of his books to their better endowment. His sympathies were wide, and he was always ready to promote any scheme of a philanthropic or religious nature in which he saw suggestions of future usefulness. The pleasant humour of his writings, and the play of cultured reminiscence with which he lighted up the descriptions of his travels, were special features of his literary style. His love for manly exercise was not confined to the sea. He was an ardent volunteer, and for many years an officer in the London Scottish.

Mr. MacGregor became a life-fellow of the Royal Geographical Society in 1872. In 1873 he married a daughter of Admiral Sir Crawford Callin, and latterly he resided in Bournemouth.

NEW GEOGRAPHICAL PUBLICATIONS.

(By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.)

EUROPE.

Felbermann, Louis.—Hungary and its People. London, Griffith, Farrar & Co., 1892 : 8vo, pp. 380, with map and illustrations.

This account of the Magyar people, and of the beauties of the country they inhabit, is written in a naive, and often almost childlike, style, possibly due to the author's imperfect familiarity with our language.

Four chapters are devoted to the history of Hungary, and here the patriotism of the author is decidedly more evident than his impartiality. The rest of the book partakes of the nature of a guide for tourists, to whom it might prove of service, as no object of interest is suffered to pass unnoticed. There is a fine description of the scenery of the Alföld, or great plain. It is an interesting exception to generally-received theories to find the inhabitants of a great plain incomparably more courageous, more moral, and more enduring than the dwellers among the surrounding hills. A short account is given of the social customs of the Slovaks, Gips, Czigany, Szekelys, and Wallachians, and from certain indications we would infer that they must have a struggle to retain those customs on account of the efforts of the dominant race to Magyarise the other occupants of the country.

The map claims to be "the first authentic and correct map of Hungary issued in English literature." Its special merit seems to lie in the selection of places, and in the use of Hungarian instead of German names.

Potiche, Vicomte de.—La Baie du Mont Saint-Michel et ses Approches. Paris, J. Lechevalier, and others, 1891 : large 8vo, pp. xvi. and 308. Numerous maps.

This monumental work is a model of statistical precision, although devoid of any literary grace. It gives full data, including an extensive bibliography, of the history of the Bay of Mont Saint-Michel. The author classifies his researches in six "books," dealing respectively with archæology, geography, Roman roads and history of the region, geology, refutation of objections, and general conclusions. He appears to have weighed and tested all the records with scrupulous care, and we have some confidence in accepting his final result. This is in effect that the Bay of Mont Saint-Michel has been formed entirely within historic times, that its site was formerly occupied by a forest and traversed by Roman roads. The sea gradually encroached as the land subsided, and a series of islands was detached from the mainland and underwent progressive diminution in area. The separation of Guernsey, Sark, and other of the Channel Islands, took place at a period too remote to give rise to tradition ;

the sea surrounded Mont Saint-Michel during the third and fourth centuries, and since then the bay has steadily enlarged. Jersey would seem to have been detached from the mainland as late as the fifth or sixth century, and to have lost a third of its area between the eighth and fourteenth centuries. After summing up all the evidence, the author concludes epigrammatically by affirming that if no legend of an ancient forest of Sciecy had existed, it would now be necessary to invent one.

ASIA.

- Armstrong, A.**—Shantung (China). Shanghai, 1891: sm. 4to, pp. viii. and 198. [Presented by the Author.]

A useful compilation of notes regarding the Province of Shantung, giving a general outline of the geography and history of the province, a sketch of its missions, and notes of a journey to the tomb of Confucius, with a new map specially compiled for the volume.

- Chantre [Mme.], B.**—A Travers l'Arménie Russe. Tour du Monde, LXI. (1891): 369-416; LXII. (1891): 225-258; LXIII. (1892): 177, and LXIV. (1892): 161-192.

The profusely illustrated journal of Mme. Chantre, who accompanied her husband in 1890 through a considerable part of Russian Armenia.

AFRICA.

- Borsari, F.**—Le zone colonizzabili dell'Eritrea e delle finitime regioni etiopiche. Milan, U. Hoepli, 1890: 8vo, pp. 96.

A topographical description of the Italian Colonies bordering the Red Sea coast of Africa, and of Northern Ethiopia, with chapters dealing with the climate, geology, and colonisation of the region. There are two maps, coloured respectively to show the cultivable zone of Eritrea and Northern Ethiopia, and the geological formation of the country.

- Constantin, Vicomte de.**—L'Archimandrite Paisi et l'Ataman Achinoff. Une Expédition Religieuse en Abyssinie. Paris, Libraire de la Nouvelle Revue, 1891: 8vo, pp. xv. and 344. Price 3 fr. 50 cents.

An account of the "Free Cossack" Achinoff's Abyssinian mission, with comments on the bombardment of his camp by the French Red Sea fleet.

- Lallemand, Charles.**—La Tunisie. Paris, Maison Quintin, 1892: large 4to, pp. 263. Coloured illustrations.

The most striking feature of this remarkably beautiful book is the great number of the author's water-colours reproduced. These give a conception of semi-tropical shadelessness and colour such as no amount of description nor the best photographs could convey. M. Lallemand designed this work as an extension to the whole Protectorate of his earlier illustrated description of the city of Tunis. After a general description of the country, there is a brief account of the coast-line town by town, with due attention to ruins and ancient sites. Then follows an account of the desert region, the shotts, and oases. In all cases the chief resources of the district are referred to, and in conclusion there is a summary of the advantages accruing from French control. Curiously enough, there is no list of illustrations.

- Mockler-Ferryman [Capt.], A. F.**—Up the Niger. Narrative of Major Claude Macdonald's Mission to the Niger and Benue Rivers, West Africa. London, G. Philip & Son, 1892: 8vo, pp. xx. and 326. Price 16s. [Presented by the Publishers.]

In this well-illustrated and neatly got up volume Captain Mockler-Ferryman gives the narrative of Sir Claude Macdonald's Mission to the Niger

Territories in 1890, which he accompanied as secretary. The expedition was specially charged with opening direct communications between the British Government and the various chiefs and kings of the Niger and Benue, and was instructed to generally inspect and report on the management of the Royal Niger Company. A second and distinct object was to visit Ilorin, in the Yoruba country, and endeavour to bring about peace between the Ilorins and Ibadans, whose warfare was seriously crippling the trade of Lagos. While the narrative of the expedition forms the main part of the book there are useful historical introductions to many of the chapters, and short accounts of the various tribes met with, their customs, and trade. An important chapter by Captain Day, on Music and Musical Instruments, appendices, including a brief vocabulary, and a good index, complete the volume. Captain Mockler-Ferryman pays a high tribute to the civilising power of the native missionaries, who, since the advent of Bishop Crowther, fifty years ago, have been at work in the Niger lands.

Santos [Fr.], João dos.—*Ethiopia Oriental*. Lisboa: Bibliotheca de Clássicos Portuguezes, 1891: 12mo, pp. 480.

A cheap reprint of the travels of the early Portuguese missionary, João dos Santos, in Mozambique and the neighbouring parts in East Africa, from the original folio of 1609, which was published shortly after his return to Europe.

Wiese, Carlos.—*Expedição Portuguesa a M'pessene (1889)*. Boletim Sociedade de Geographia de Lisboa (1891): 236-273, 331-430.

Account of a journey from Tete, by Cachombo, Chacanga, and Maravia, to M'Pessene, with remarks on the organisation of the Portuguese possessions.

AMERICA.

Eggers [Baron], H.—*Die Bahama-Inseln*. Globus, LXII. (1892): 209-214.

A sketch of the physical, biological, and economic condition of the Bahamas.

Horsford, Eben Norton.—*The Landfall of Leif Erikson, A.D. 1000, and the Site of his Houses in Vinland*. Boston, Damrel and Upham, 1892: large 4to, pp. 160. Maps and illustrations. [Presented by the Author.]

Mr. Horsford has brought together a great mass of evidence from the Sagas, from traditions, from ancient maps, and from archaeological discoveries, bearing on the discovery and temporary settlement of America by the Northmen. The particular purpose of this volume is to determine the landing-place of Leif Erikson, whose Vinland is generally admitted to have been some part of North America. Mr. Horsford's conclusion is that Vinland was situated in south-eastern New England, and Leif's houses were built on the shore of Charles River, between Boston and Cambridge. He believes that he has found remains of the actual houses and fish-tanks constructed by the Northmen, and is at immense pains to cause the various lines of evidence to converge and demonstrate his views.

The copy of his work which Mr. Horsford presented to the Society has had an adventurous voyage of its own, having been lost in the wreck of the *Eider*, and recovered unhurt as to letterpress, although requiring to be re-bound.

AUSTRALASIA.

Morgan, E. Delmar.—*Early Discovery of Australia*. With seven maps. Proc. Roy. Geog. Soc. Australasia (Sydney), V. (1892): 90-96.

A paper read to the Berne Geographical Congress, now published with the illustrative maps.

Tasmania, Bishop of.—*A Mutton Bird Island*. 8vo, pp. 10.

A picturesque description of the Furneaux Islands, in Bass Strait, from the 'New Review' for August, 1892.

OCEANIA.

Oudemans, J. A. C.—Notiz über die Triangulation von Java. *Comptes Rendus de l'Association Géodésique Internationale pour 1891*: pp. 195-208.

Van der Chijs.—Dagh-Register gehouden in 't Casteel Batavia vant passerende daer ter plaatse als over geheel Nederlandts-India, Anno 1663. Batavia, 1891. 4to, pp. 754. [Presented by the Batavian Genootschap van Kunsten en Wetenschappen.]

This volume, prepared at the joint expense of the Batavian Society of Arts and Science, and of the Government of the Dutch East Indies, contains full materials for the history of Dutch enterprise in the Malay archipelago in 1663, with many quaint bills of lading, and lists of mariners engaged in the eastern trade.

Van der Chijs.—Nederlandsch-Indisch Plakaatboek, 1602-1811. Batavia, 1885-1891. Four volumes. 8vo. [Presented by the Batavian Genootschap van Kunsten en Wetenschappen.]

ARCTIC REGIONS.

Ryder, C.—Den Østgrønlandske Expedition. *Geografisk Tidsskrift*, II. (1891-92): 187-202. [Another copy, presented by the Author.]

Lieutenant Ryder's report of his work on the east coast of Greenland in 1891 and 1892. The paper is illustrated by a map of Scoresby Sound, which has been thoroughly explored.

GENERAL.

Dent, C. T.—Mountaineering. With contributions by Wm. Conway, D. W. Freshfield, C. E. Mathews, C. Pilkington, Sir F. Pollock, H. G. Willink, and an Introduction by Mr. Justice Wills. Second edition. London, Longmans & Co., 1892: cr. 8vo, pp. xx. and 439, illustrations. Price 10s. 6d. [Presented by the Publishers.]

This volume is addressed as much to the mountain traveller as to the Swiss tourist. From the point of view of its editor, Mr. C. Dent, himself a Caucasian traveller, the Alps are evidently regarded as stepping-stones to higher things, and the climbing Alpine clubman as one of the "dead selves" on which the Himalayan or Andean explorer is to rise. Into the A B C of the mountaineering craft, as expounded at length and in minute detail by Mr. C. Dent and his colleagues, we need not enter here. But every traveller who is going into a mountainous country may be recommended to study the editor's chapters on camping, equipment, reconnoitring, and photography, and Mr. Conway's on maps and guide-books.

Mr. Douglas Freshfield deals with mountain travel beyond the Alps, pointing out the principal fields for discovery, the seasons for visiting them, the difficulties to be encountered in organising a party, in converting Alpine guides into travellers, and in making mountaineers—in the technical sense of the term—out of hillmen. Sir Frederick Pollock throws some light on the eminent discoverers of the Alps in the 16th century, who took an interest in them before the Fellows of our Royal Society had subscribed to illustrate Scheuchzer's massive volumes. Mr. C. E. Mathews recalls the services of Forbes, his pupil Reilly, and John Ball, to our geographical knowledge of a region which, fifty years ago, was, as Mr. Ball wrote, little better mapped or known than many parts of the interior of Africa.

The moral of the volume appears to be that mountaineering is a craft that requires an apprenticeship, and one in which judgment and forethought count

for far more than physical force. The illustrations by Mr. Willink, well-known as an Alpine artist, will doubtless prove popular. Mr. Willink adds some suggestions as to how to sketch on a journey, which will be very useful to those who are capable of profiting by them.

Hirsch, A.—*Comptes Rendus des Séances de l'Association Géologique Internationale réunie à Florence du 8 au 17 Octobre, 1891*: 4to, pp. 234. Plates.

The proceedings of the Conference, given in French and German, are followed by papers printed in full.

Höhnel, L. E. von, A. Rosiwal, F. Toula, und E. Suess.—*Beiträge zur Geologischen Kenntniss des Ostlichen Afrika*. Vienna: Pöppsky, 1891: 4to, pp. 140. Maps and plates.

This valuable account of the geological results of Count Teleki's expedition is a reprint from the 'Denkschriften' of the Vienna Academy. Lieut. von Höhnel, in an introductory chapter, deals with the physical features of that part of Africa explored by Count Teleki and himself. Dr. A. Rosiwal describes the minerals collected, and enters fully into the work done by previous explorers, among whom Mr. Joseph Thomson is accorded a prominent place. Professor Toula supplies a geological map on a scale of 1 : 1,370,000, which is a vast improvement upon the older maps by Sadebeck (in Von der Decken's Reisen) and Thomson. This map stretches from Usambara in the south to beyond Lakes Rudolph and Stefanie. Recent eruptive rocks cover by far the largest area; and next to them crystalline rocks. Sedimentary formations play quite a subordinate part. The concluding section, by Professor E. Suess, deals with the depressed areas in Eastern Africa, and their connection with similar depressions in Syria.—[E. G. R.]

[Imperial Institute Year-Book.]—The Year-Book of the Imperial Institute of the United Kingdom, the Colonies, and India. A Statistical Record of the Resources and Trade of the Colonial and Indian Possessions of the British Empire. [London], John Murray, etc., 1892: large 8vo, pp. xii. and 824.

This is the first issue of what promises to be a useful manual of reference on matters connected with the industrial and material condition of the Colonies and India. The volume, of course, largely deals with the natural resources and trade of the Colonial and Indian sections of the Empire; but apart from this information is given on other topics of interest. With the exception of India, a concise historical sketch is prefixed to the account of each Colony, showing how it came into the possession of the British Crown, and tracing the most important steps in its political history. The volume further gives statistics regarding the area, population, and climate of each portion of Greater Britain; finance, educational resources, system of Government, and means of communication. There is a number of diagrammatic representations of comparative statistics relating to the commerce of different parts of the empire, and to other matters, in themselves a useful feature of the Year-Book; and a map of the world showing the British possessions, with the various means of communication, &c.

Leroy-Beaulieu [Prof.], Paul.—*De la Colonisation chez les Peuples Modernes*. Fourth edition. Paris, Guillaumin et Cie., 1891: 8vo, pp. xix. and 868.

The first quarter of this exhaustive study of modern colonisation deals with the foreign acquisitions of European countries prior to the nineteenth century. Most of the book is occupied with a consideration of the territorial expansion of European colonies in the present century, the development of each nation being given in turn with reference to the natural and political conditions which affected it. The latter part is theoretical, entering into the economic conditions of colonies, and the philosophy of colonisation, stress being laid on the responsibilities of the colonising power to the people whose territory is entered.

North, Marianne.—*Recollections of a Happy Life.* London, Macmillan & Co., 1892: 2 vols., pp. 694, 8vo. With two portraits and a map.

These volumes form the autobiography of Miss North, edited by her sister, Mrs. J. A. Symonds. They are eminently readable, abounding in personal adventure and amusing incidents. Miss North was an indefatigable traveller, visiting and residing in some portion of all the continents. Amongst her longest and most interesting visits were those paid to Jamaica, Brazil, Java, India, Australia, and the Seychelles Islands. Her last journey was undertaken towards the close of 1884 to Chili, in order to see the *Dracaena imbricata* in its home. The special feature of the book is, as was to be expected, the fine descriptions of flowers and trees. Miss North's sole purpose in her travels was to paint the characteristic vegetation of the various countries. The results of her labours are to be seen in the gallery specially built by herself for the accommodation of her paintings at Kew. The book is a worthy record of the wonderful energy and endurance of the writer.

The reader would follow Miss North's journeys with more intelligence if there had been a map of the chief districts visited. Through this omission the visit to Java, especially, is, for the ordinary reader, almost unintelligible.

Robinson, H. J.—*Colonial Chronology; A Chronology of the Principal Events Connected with the English Colonies and India, from the Close of the 15th Century to the Present Time.* London, Lawrence & Bullen, 1892: 4to, pp. xiv. and 304. Maps. [Presented by the Publishers.]

Part 1 of this work takes the form of a general chronology of the British possessions abroad, and events more or less nearly concerning them. This is neatly presented in four parallel columns, occupying the double page, and relating respectively to Europe, America, Africa, Asia, and Australasia, the dates being entered on the margin. By this means the advantage of comparing the events occurring in various parts of the world is secured, and yet the line of development of each of the main groups of possessions is kept distinct. Part 2 is a more detailed chronology, in which the colonies and India are arranged alphabetically, with a few selected statistics referring to different dates. A complete equipment of serviceable maps by Stanford completes what cannot fail to be a most convenient, as it appears to be a trustworthy, book of reference.

Thomson [Dr.], James.—*On the Grand Currents of Atmospheric Circulation.* 'Proceedings Royal Society,' LI. (1892): 42-46.

Abstract of the Bakerian lecture by the late Professor J. Thomson.

NEW MAPS.

(By J. COLLS, *Map Curator, &c.*)

THE WORLD.

"Mappamondo di Torino."—II —. Riprodotto e descritto da Giuseppe Ottino, Bibliotecario della Nazionale di Torino. Carlo Clausen, Torino, 1892. [Presented by the Publisher.]

This is a coloured facsimile of a map in the National Library of Turin. The date of the original is not certain, but it is supposed to belong to the twelfth century. Uncoloured copies of this map are by no means uncommon, and the chief interest in the present map lies in the fact that the colours of the original have been reproduced. It, however, differs in some important details from the copy of the original, which is given in Santaren's well-known atlas; but this may probably be accounted for by the fact that the

previous facsimiles have been copied from Pasini's reproduction of 1749, a copy of which is also given with the above, to facilitate comparison. The map is accompanied by explanatory letterpress. It may be mentioned that the edition consists of only 250 copies.

EUROPE.

Bulgaria.—Map of —. Scale 1: 420,000, or 5·9 geographical miles to an inch. Lettering in Russian. Ch. G. Danoff, Philippopolis, 1892. Lithographed by G. Freytag and Berndt, Wien. 10 sheets. [Presented by the Author, through Messrs. G. Freytag and Berndt.]

This is a general map of Bulgaria, on which all means of communication are shown. The lettering is in Russian character, which will greatly limit its usefulness; it is, however, very clearly drawn, and the hill shading is effective.

Deutschland.—Florenskarte von Nord —, für das 12 bis 15 Jahrhundert. Scale 1: 3,700,000, or 60·7 geographical miles to an inch. Entworfen von Dr. Ernst H. L. Krause. Petermann's 'Geographische Mittheilungen.' Jahrgang, 1892. Taf. 18. Justus Perthes, Gotha. [Presented by the Publisher.]

Deutschen Reiches.—Karte des —. Scale 1: 100,000, or 1·3 geographical miles to an inch. Sheets:—44, Stolpmünde; 93, Kolberg; 217, Schwedt; 374, Rawitsch. Herausgegeben von der Kartogr. Abtheilung der Königl. Preuss. Landes-Aufnahme, 1892. Price 1s. 6d. each sheet. (Dulau.)

France.—Carte de la —, dressé par le Service Vicinal par ordre du Ministre de l'Intérieur. Scale 1: 100,000, or 1·3 geographical miles to an inch. Feuilles VIII. 13, Îles Chausey; XI. 33, Mont-de-Marsan; XII. 33, Eauze; XII. 34, Plaisance; XIV. 33, Beaumont; XIV. 34, Pile-Jourdain; XV. 35, Villefranche-de-Lauragais; XVII. 32, Requista; XVII. 33, St. Sernin-sur-Rance; XVIII. 31, St. Genies; XVIII. 32, Millau; XVIII. 33, St. Affrique; XVIII. 34, Lodève; XIX. 32, Valleraugue; XIX. 33, Le Vigan; XIX. 34, Clermont-l'Hérault; XX. 31, Besaëges; XX. 33, St. Hippolyte-du-Fort. Price 7d. each sheet. (Dulau.)

Scotland.—Bartholomew's Reduced Ordnance Survey of —. Scale 1: 126,120, or 1·74 geographical miles to an inch. Sheets No. 10, Mull, Iona, &c.; No. 25, Dornoch, Lairg, &c. J. Bartholomew & Co., Edinburgh, 1892. Price 2s. each, mounted on cloth. [Presented by the Publishers.]

These maps have been produced in the usual clear style of this series. They are orographically coloured, and in addition, the heights of all important points are given in figures. All main roads are coloured brown, and are thus easily distinguished; the scale is sufficiently large for general reference, and they are in all respects well suited to meet the wants of tourists.

Switzerland.—Evolena, Zermatt, Monte Rosa. Scale 1: 50,000, or 1·4 inches to a geographical mile. Nach dem Siegfried-Atlas, bearbeitet v. d. topogr. Anat. Gebr. Kümmerly, Bern. Beilagen zum Jahrbuch des Schweizer Alpenclub. Band XXVII. No. 1. Bern. Schmid, Francke & Co. (vorm. J. Dalspache Buchhandlung), 1892.

This map, which is published as a supplement to the Swiss Alpine Club Journal, is a reproduction of the sheets of the Swiss Government Survey. The admirable style in which all these maps have been produced is well known, and in the present instance the effect has been heightened by the excellent manner in which colouring has been employed to bring out the relief, thus, while preserving all the scientific results of the Survey, it also has the advantages of conveying to those not accustomed to the system of contouring an

accurate idea of the physical features of the country. The colours are well chosen, the lettering clear, and it is altogether a beautiful specimen of cartography.

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Provinces), and of Native States Gwalior and Dholpur (Central India and Rajputana Agencies). Seasons 1861-62 and 1873-74-75. 391, Parts of Gwalior, Kurwai, Pathari, and Bhopal, Native States (Central India Agency), and of District Sangor (Central Provinces). Season 1856-57 and 1871-72. 430, Parts of District Damoh (Central Provinces), and of Panna, Ajaigarh, and Bijawar States (Central India Agency). Seasons 1864-66 and 1869-70. 467, Parts of Rewah (Central India Agency), and Chang Bhakar Tributary State (Chota Nagpore), Bengal. Seasons 1866 to 1868 and 1870-71. 478, Parts of Rewah Native State (Central India Agency), and of Korea Tributary State, Chota Nagpore (Bengal). Seasons 1868-69 and 1871-72.—Madras Survey, 1 inch to a mile. Sheet 14, Parts of Districts Kadur and Shimoga (Mysore). Seasons 1878-81. 28, Parts of Districts Kadur and Hassan (Mysore). Seasons 1879-82. 30, Parts of Districts Hassan and Kadur (Mysore). Seasons 1879-81. 44, Parts of Districts Chitaldroog and Shimoga (Mysore). Season 1881-82. 45, Parts of Districts Chitaldroog, Kadur, and Shimoga (Mysore). Season 1880-81. 46, Parts of Districts Chitaldroog, Hassan, Kadur, and Tankur (Mysore). Season 1880-81. 69, Part of District Chitaldroog (Mysore). Season 1882 3.—Oudh Revenue Survey, 1 inch to a mile. 100, District Kheri. Season 1865-66. 101, Districts Kheri, Hardoi, and Sitapur. Seasons 1864-66. 114, District Kheri. Seasons 1867-69. 115, District Kheri. Seasons 1865-67.—North-West Provinces Survey, 1 inch to a mile. 200, District Mirzapur. Seasons 1884-85-86.—North-West Provinces and Oudh Survey, 1 inch to a mile. 57, Parts of District Jhansi (N.W. Provinces), and of Datia, Gwalior, Samthar, and Orchha Native States (Central India Agency). Seasons 1853-57 and 1862-63. 59, Parts of Districts Lalitpur and Jhansi (N.W. Provinces), and of Gwalior and Orchha Native States (Central India Agency). Seasons 1855-57 and 1860-61. 79, Parts of Districts Jhansi and Hamirpur (N.W. Provinces), and of Garrauli, Alipura, Bihat, and Orchha Native States (Bundelkhand Central India Agency). 103 (preliminary edition), District Basti (with overlap of District Fyzabad). Seasons 1883 to 1885. 175 (preliminary edition), District Basti. Seasons 1883 to 1887. 181, Districts Jannpur, Benares, and Mirzapur. Seasons 1864 to 1869, 1878 to 1880, and 1883-84. 203, District Gorakhpur. Seasons 1886 to 1888. 204, District Gorakhpur. Seasons 1886-87. 206, District Gorakhpur. Seasons 1883 to 1887.—Punjab Survey, 1 inch to a mile. 116, District Jhang. Season 1888-89. 118, Districts Jhang and Dera Ismail Khan. Seasons 1880-81 and 1888-89. 142, 143, 145, 168, and 169, District Jhang. Season 1888-89. 211, 212, and 223, District Ferozepore. Seasons 1877-79 and 1887-88. 224, District Ferozepore and Faridkot State. Seasons 1884-85, 1887-88, 1889-90. 235, District Jullundur and Kapurthala State (1st edition). Season 1885-86. 237, Districts Ferozepore, Ludbiana, and Jullundur and Kalsia State. Seasons 1885-86 and 1889-90. 238, Districts Ferozepore and Ludbiana and Faridkot, Kalsia, Patiala, and Nabha States. Seasons 1884 to 1886, and 1887-88, and 1889-90. 248 (1st edition), District Hoshiarpur. Season 1886-87.

(Stanford, Agent.)

Klein-Asien.—Dr. Walther Ruge's Reisen und Aufnahmen in —. 1880. Scale 1: 250,000, or 3·4 geographical miles to an inch. Petermann's 'Geographische Mittheilungen.' Jahrgang, 1892. Tafel 17. Justus Perthes, Gotha. [Presented by the Publisher.]

Teheran.—Plan of —. Compiled by Solimán Khan, under the supervision of Abdul Ghaffar, Najmul Mulk, Astronomer, and Professor of Mathematics at the College Dar ul funun at Teheran, from surveys made by the students of the

College between 1868 and 1888. Published at Teheran, April, 1892. Lithographed. [Presented by General A. Houtum-Schindler.]

The surveys from which this map has been compiled were made by the students of the Dar ul fundu College, and extended over a period of twenty years. A sketch-map of Teheran had been made in 1857-58 by the students of the college, under the superintendence of an Austrian artillery officer in Persian service, but the measurement having been taken in paces, and the angles only approximately observed, it contained many inaccuracies, and is now only of value as showing to some extent the condition of the city thirty years ago. Many parts of the map, however, were left blank owing to the owners of some lands and buildings having refused to permit them to be surveyed. In the present map all these omissions have been filled up, and it shows the city as it actually is.

The history of this later survey, as given by Professor Najmul Mulk, under whose superintendence it was carried on, is interesting. It seems that when the new bastions were constructed, in 1868, the authorities came to the conclusion that it was necessary to make a new map of the city, which would include all the area within the fortifications. Twenty students of the college were chosen to carry out the new survey, and they worked for a whole year, surveying every day from early morning till night, plotting their work every evening. As soon as these twenty students had finished their studies and left the college, another twenty continued the work until the time came for them to leave college, when it was again continued by another twenty, and so on until the survey was finished.

The map is printed in colour, and contains many notes, and an explanation of the symbols employed in its construction. The lettering is in Persian character; but General Houtum-Schindler has forwarded with the map a translation of the notes.

AMERICA.

Mackenzie and Yukon Basins.—Map of a Portion of the ——. To accompany Report of R. G. McCounell, A.A., 1890. Scale 1 : 500,000, or 0·9 geographical miles to an inch. 9 sheets. Geological Survey Department, Ottawa. To accompany Part "D," Annual Report, Vol. IV., 1888-90. [Presented by the Director of the Geological and Natural History Survey of Canada.]

This map contains some important and entirely new work. It embraces the Mackenzie basin from Lake Athabasca to the delta, including the Great Slave Lake and the Liard River, the Porcupine River, the Upper Yukon, the Pelly, and the Lewis Rivers, as far as the boundary-line between British Columbia and Alaska. The topography is the result of actual survey, and each sheet contains copious notes, those on the geology of the country being printed in red, while others, having reference to topographical features, hydrography, &c., are given in black.

The manner in which this survey has been successfully conducted, in the face of serious obstacles, reflects the greatest credit on all who have taken part in it; and the information collected and mapped forms a most valuable addition to our geographical knowledge of North-West America.

Missouri.—Geological Survey of ——. The Higginsville Sheet, in Lafayette County. Scale 1 : 62,500, or 1·2 inches to a geographical mile. Published by the Geological Survey of Missouri. Arthur Winslow, State Geologist. Jefferson City, April, 1892. With letterpress. [Presented by the State Geologist.]

This is a sheet of the geological survey of the State of Missouri, which has been prepared under the supervision of Mr. Arthur Winslow, State Geologist. The map exhibits both the topographical features and geological formations. The elevations are shown by contour lines, and the geological features by tints of colouring. The report which accompanies the sheet contains a large amount of information with regard to the Higginsville district.

New Brunswick.—Southern ——. Surface Geology. Scale 1:253,440, or 3·47 geographical miles to an inch. Geological Survey Department, Ottawa. To accompany Part "N," Annual Report, 1888-89. 3 sheets:—No. 1, $\frac{1}{2}$ -sheet, 1, S.W.; No. 2, $\frac{1}{2}$ -sheet, 1, S.E.; No. 3, $\frac{1}{2}$ -sheet, 1, N.E. [Presented by the Director of the Geological and Natural History Survey of Canada.]

There are three sections of sheet No. 1 of the geological survey of Southern New Brunswick. Section 1, N.E., contains parts of King's County, Queen's County, Westmorland, Albert, and Sunbury. Section 1, S.E., part of King's County and St. John's. Section 1, S.W., part of Charlotte County. There are numerous notes on the margin, and explanations of the colours and symbols employed.

CHARTS.

North Atlantic Ocean.—Pilot Chart of the ——. October, 1892. Published Monthly at the Hydrographic Office, Bureau of Navigation, Navy Department, Washington, D.C. [Presented by the United States Hydrographic Office.]

ATLASER.

Saint-Martin, M. Vivien de.—Atlas Universel de Géographie, construit d'après les sources originales et les documents les plus récents, cartes, voyages, mémoires, travaux géodésiques, &c. Avec un Texte Analytique. Ouvrage commencé par M. Vivien de Saint-Martin et continué par Fr. Schrader. 84 Cartes gravées sur cuivre sous la direction de MM. E. Collin et Delaune. Paris, Librairie Hachette et Cie, 1892. Sheet No. 33, Europe Centrale. Feuille 1. Price 2s. [Dukau.]

This is Sheet 1 of a map of Central Europe, which will be completed in four parts. Independent or Federal States, the principal territorial divisions, &c., are distinguished by the type in which the names are printed. The importance of towns (as regards population) and fortified cities are distinguished by the symbols employed to denote their positions, and all means of communication are laid down. Like all the previously published sheets of this atlas, this map has been produced in a very superior style; but too much has been attempted for its scale, the result being that it is so crowded with names and symbols that the physical features are in places almost obliterated.

Universal Atlas.—The ——. Complete in 28 parts, including Index. Published by Cassell & Co., Limited, London, for the Atlas Publishing Company, Limited. Part XIX. [Presented by the Publishers.]

This issue contains maps of Scotland, Germany, and Victoria and New South Wales.

PHOTOGRAPHS.

France.—Fourteen photographs taken by James Jackson, Esq., in the Departments of Basses-Pyrénées and Hautes-Pyrénées. September, 1892. [Presented by James Jackson, Esq.]

These photographs were taken by Mr. James Jackson in the Departments of Hautes and Basses-Pyrénées. They exhibit characteristic features of the country, and are excellent specimens of photography.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.





PROCEEDINGS
OF THE
ROYAL GEOGRAPHICAL SOCIETY
AND MONTHLY RECORD OF GEOGRAPHY.

*Travels from the East Coast to Uganda, Lake Albert Edward,
and Lake Albert.*

By CAPTAIN F. D. LUGARD.

(Read at the Evening Meeting, November 3rd, 1892.)

Maps, p. 884.*

WHILE appreciating most fully the honour you have done me in inviting me to read a paper before the Royal Geographical Society to-night, I am keenly—even painfully—aware of my own inability to do justice to my subject. I must, therefore, begin by disclaiming all pretensions to scientific exploration, and beg your indulgence while I merely read to you a few commonplace, and wholly unscientific, remarks on the countries in which I have recently travelled—not as an explorer, with ample leisure to devote to the study of those intensely interesting problems which are the special care of the Royal Geographical Society, but solely in the prosecution of other, and at times very onerous, duties; equipped with nothing more than my watch and a pocket compass, with which to make such maps, or rather road-charts, as I have been able to place in Mr. Ravenstein's hands, to assist him in some small degree in producing these very admirable maps.

To many people in England, Africa is still a great Dark Continent, the continent of our childhood, when we pictured the vast interior as something between a great Sahara and a vast swamp, a land of naked and fierce savages, of pestilential malaria, of savage beasts with ferocious appetites. Simooms and siroccos, crocodiles and puff adders, obtrusive lions and inquisitive gorillas are jumbled up in kaleidoscopic confusion; and so we African travellers, who have emerged safely out of all this supposed tangle of dangers, are credited with all sorts of qualities dear to our self-love, but hardly merited. Many readers whom

* The detailed map of the region between Uganda and Lakes Albert and Albert Edward will be published in the January number.

I have met of that admirably-written work of Professor Drummond's, 'Tropical Africa,' have asked me, "Is it true that there are paths everywhere throughout Africa?" It was a revelation entirely incompatible with the Sahara-and-swamp idea of Africa. But the Africa of reality is a very different thing, especially at the higher altitudes. From Kikuyu to Kavirondo you will pass over a plateau from 6000 to 10,000 feet high, where in places you will see soft, springy turf like an English lawn; you will see the forget-me-not, and clover, and jessamine; you will feel the nettle, and bramble, and thistle; ever-green bushes of very many kinds abound, and the scenery is that of Europe. Rushing streams and sheltered bays of lakes afford the same picturesque glimpses of scenery as you will find in Scotland, and as you scale the hills, with the cold wind in your teeth, you will feel the same bracing atmosphere.

At the request of the Administrator of the Imperial British East Africa Company, I left Mombasa in December, 1889, to explore the River Sabakhi, and with discretionary power to make a series of small stockades from the coast area to Machako's, the Company's furthest outpost, some 300 miles from the coast, should I find the route a feasible one for transport. The Sabakhi is not a navigable river, its course being impeded by rapids some 60 or 70 miles only from the coast; but up to this point it would doubtless be available for the navigation of small craft, though at present it is singular that there are few or no canoes upon it. As a route to the interior, however, it affords an excellent line. There is a supply of water at all seasons of the year, a point of extreme importance in crossing the often arid and parched zone of country lying between the coast and the plateaux of the interior. These latter are mostly well watered. For transport the Sabakhi also offered the advantages of a gradual rise, with few ravines or broken ground to cross grass for animals in the long rich glades which occur at intervals, and abundance of tree-foder along the whole course of the river for camels.

Its greatest and only drawback lay in the fact that the whole country is uninhabited, and therefore foodless, and traversed only at certain well-known points by raiding parties of Massai on the war-path. This difficulty it was proposed to meet by establishing colonies around the small stockaded positions I formed, and which, for this very purpose, I had located in the fertile glades, which would provide arable land for cultivation and pasture for cattle. These colonies, it was proposed, should consist of Persian or Indian immigrants, and of slaves who had worked out their own redemption under a plan proposed by myself and successfully inaugurated by Mr. Mackenzie. Other duties called me away, or I should have taken great interest in the establishment of these colonies—a task the Imperial British East Africa Company were willing to entrust to me

—and in this way testing at once the capabilities of the country, and the possibilities of Asiatic immigration for agricultural purposes, and the practical utility of the scheme for the self-emancipation of slaves. These glades, I note, have since been described by the Railway Survey party as areas covered with standing water in the rains. I am inclined to think this must have been due to an exceptional rainfall, since I passed along this route in the height of the rains myself, and found them entirely free from swamp; nor did I or the natives with me (one being a Persian, who had come with the express purpose of seeing if the country was eligible for agricultural purposes), detect any signs of flood marks. The basin of the Sabakhi is rocky, and the surrounding country is sterile, with the exception of the glades.

Passing the small lakes and fertile district of Jellore, some 20 miles from its mouth at Melindi—now the location of a mission station—one crosses a barren-looking country covered with sparse scrub, occasionally passing through small patches of fine forest, till the very fertile and populated district of Makongeni is reached, at 40 miles from the coast. It is here that the route I took from Mombasa struck the river; beyond this point cultivation and population entirely cease. You will pass through a very fine piece of primeval forest as you leave the dense villages of the fugitive slaves of Makongeni—forest in which there is a fair amount of the rubber vine—and you will then emerge from the shade of the giant trees into a dense impenetrable low forest of cactus, prickly-pear, milk hedge, and thorny acacia and mimosa bushes. Every bush has a thorn—every bush that grows a thorn seems to have found its *habitat* here. As you pass onwards, always with the noble river flowing on your right, with magnificent feathery acacia drooping over it—the only fine tree now to be seen, and often 2 feet in the diameter of the bole—the same endless forest of crooked, distorted, prickly bushes proves the barrenness of the soil; and barren it is, for surface granite and quartz take the place of soil. This scrub forest extends away over the Taru plain for a considerable distance. Viewed from any knoll, it presents a dull uniform grey of endless bush and cactus.

The Taru desert is a wilderness of low thorn jungle stretching away to the horizon. Great granite rocks appear on the surface, and often (as at Taru) contain huge water-worn cavities 4 or 5 feet deep. These water-holes are a singular phenomenon, seeing that the country shows so few other signs of the action of running water. Through scores of years, perhaps centuries, the stone which had found its lodgment in a hollow in the rock must have ceaselessly revolved round and round, impelled by an eddying whirlpool of water, wearing for itself a larger and a larger cavity, deeper and deeper, with perfectly rounded and smooth sides. And now the rock forms part of the waterless plain; the very stone which wore the strange hole is often to be seen; the cavity worn by ages of water-action is now the sole storage for water in a waterless country.

Strangest of all, it seemed to me that these water-holes at Taru were not in the bed of a stream, nor even on the low-lying ground, thereby indicating a complete change of configuration as well as climatic conditions.

Following the Sabakhi you will presently debouch on a glade fringed with the camel "jhow" bush and the Nkongi aloe, which forms the whole of the undergrowth of the sterile quartz-land. This Nkongi is a feature of the country. Shaped like a gigantic solid triangular layonet, each spiked blade terminates in a point as sharp as a needle. The wounds it inflicts on the bare-legged natives often turn to large sloughing ulcers; indeed, I have known a spike penetrate a solid English leather gaiter and go a quarter of an inch into my flesh afterwards. The Nkongi is, therefore, a plant which may be said to thrust itself upon one's attention (especially if it penetrates the flesh), and I believe it to be worthy of attention. The fibre is extremely strong, and not only makes very tough rope, but single fibres are strong enough to use as sewing-thread; I found it useful for stringing beads. As we pass upwards beyond the cataracts or rapids, and cross the Tsavo near the site of the third stockade, the acacias which fringe the bank grow larger and finer, and the hyphene palm and borassus become abundant. On the northern bank rises what looks like the edge of a plateau, terminating abruptly at the valley of the river. This range of hills, or plateau, so far unexplored, is some 700 or 800 feet above the river.

Excepting the Tsavo, there is no drainage to the Sabakhi from the south, a few small dry watercourses, in which, even in the rains, I have seen no water, being all. During all this time, from Makongeni to near the junction of the Kilwezi, you will have met probably with no living soul, unless you have had the ill-luck to fall in with a Masai band on the war-path, or a small party of Wakamba passing hastily with bows strung, escorting a batch of cattle to the coast for trade, and eager to avoid the dreaded Masai. Possibly, however, as you suddenly round an angle in the winding game-path, you may be completely taken aback to find yourself face to face with a Galla, accompanied by only two or three friends, each with a spear 7 feet long. You ask him whence he comes and whither he goes, and he replies with absolute nonchalance, and as though he had been expecting you all day, and knew you were on the other side of that opaque bush before you rounded it, that he is "walking" for pleasure. On inquiry you find that this walk probably began a month or two ago, will continue a month or more yet, that he covers from 20 to 30 miles a day, has no object in his walk except the Galla love of roaming, and no wardrobe or belongings of any sort or kind except his 7-foot spear. A strange, nomadic race, once a powerful one, now squeezed and elbowed by their two most powerful neighbours, the Somals in the north, the

Masai in the south, both of whom they dread with a constant fear. A wonderfully handsome race, with high foreheads, brown skins, and soft, wavy hair, quite different from the wool of the Bantu races.

Just short of the junction of the Kibwezi we leave the Sabakhi—or Athi, as it is here called—and strike across to the old trade route, *via* Taita, where it crosses the Kibwezi at Kikambulu. Here we are in the country of the Wakamba, whose country, Ukamba, extends from here to the borders of Kikuyu and Masai. From here we begin to ascend the inner plateau of Africa till we reach Machako's, at 5000 feet. So many travellers have now passed along this route that I must leave it to some other pen to describe the country and its people, tempted though I am to linger with them for a moment.

While still my task of opening up the Sabakhi, and building six stockades between the coast and Machako's, was hardly complete, I was recalled to organise an expedition for the occupation of Uganda. Fresh instructions, however, directed me not to proceed thither, and I left the coast for the second time on August 6th, 1890, to open up the little-known country of Kikuyu—beyond Ukamba—and build the station and stockade of Dagoreti. My task was already nearly accomplished when, on October 19th, I received orders to proceed to Uganda. After completing my work in Kikuyu, selecting the goods for barter, and laying in the necessary food to cross the 250 miles of foodless country in front of me, I left Dagoreti on November 1st, and arrived in Uganda on December 13th, passing through Masai-land and Kavirondo, and adopting the well-known route *via* Baringo, and across the mountain ranges of Elgeyo and Kamasia.

As this first route is already well known from the descriptions of Mr. Joseph Thomson, Messrs. Jackson and Gedge, and others who have passed by it since myself, I will not attempt any description of it, but will confine myself to a few remarks on the more southern and more direct route along which I returned, which in all probability the railway would take if constructed. The route branches off at the Lake Nakuru, and crosses the Mau plateau at a more southerly point, traversing the Guaso Ngishu. Passing round the north of the small lake of Nakuru, we leave the Masai behind us, and traverse a gradually-rising plain. There is no escarpment, and no difficult gradient. Passing the sources of the Lilwa, and crossing two small rivers, easily fordable except in the rains, we find we have already attained a considerable elevation. We enter a long valley with lofty hills on either side, and, still ascending, emerge eventually on the undulating grasslands of the Mau plateau. With the exception of perhaps two stretches of some 15 miles each, where there is little or no firewood, these plateaus are well wooded and well watered. Considerable patches of forest afford timber, which would answer for local building purposes and fuel. Magnificent trees of a species of juniper

rise without a branch, straight as a ship's mast, for 50 feet, and attain a diameter of 5 feet. The timber is brittle, like cedar. Bamboos, that most useful of all material for rough building purposes, are found in these forests, and excellent running streams water the country in every direction.

This country seems to me to be one of great possibilities. To us who have spent so long in the Tropics it seemed like one of Arctic cold at an elevation of 7000 to 8000 feet and more. It is here that I should like to see the grand experiment of European colonisation tried, the experiment the result of which is to determine the future of this vast continent. The locality is admirably adapted to stock-rearing operations, and ranching on the lines adopted in Manitoba and the Far West. This plateau is traversed by the Equator. It is an interesting problem, which one so wholly unscientific as myself is incompetent to do more than suggest whether, at sufficient altitudes to ensure the requisite climate, mere difference in latitude would make any difference to the adaptability of the country for European colonisation. In India, the hill stations on the slopes of the Himalayas, in the north, have not proved successful for the complete naturalisation of Europeans. Individuals thrive, but their children need the air of Europe. Further south, towards the Equator, in the Nilgherry Hills at Ootacamund, I am informed that this is not so, and that European children born and reared there are as robust and healthy as children bred in Europe. The Shire Highlands, though only at an average elevation of 3000 feet, have proved healthy to Europeans. Should it appear that the nearer the Equator the healthier the locality—given sufficient altitude to ensure the requisite climate—a point will have been established which may revolutionise our ideas of the Dark Continent, and transform its history.

Gradual and easy as was the ascent to these altitudes, the descent to the Kavirondo plain is hardly more difficult, over the northern slopes of the Nandi Hills, or round by the valley of the Nzoia. But of gradients and levels, of alternative railway routes, of bridges and comparative physical difficulties, I must leave the Railway Survey to speak.

Descending then from the lofty plateaus to the Kavirondo plain, at an elevation of nearly 4000 feet, we are again in the midst of a dense population. There is no more friendly tribe in Africa than these simple Wa-Kavirondo. Both sexes repudiate any kind of dress; but the male warrior in his garb of war is a wonderful and strange sight. Horns of antelope, tusks of the wart-hog, or huge outspread wings of gigantic cranes, from 2 to 3 feet across, are fastened on his head regardless of inconvenience; his face is painted in various devices with red and white chalk; the rest of him is as God made him. Armed with a shield and a long and inoffensive-looking spear, he will cut such capers to assure himself of his own valour as shall jeopardise his head-dress and make you smile. Warrior after warrior will come forth from the band, breathing

defiance, and leaping and bounding and spearing innumerable imaginary foes, to the admiration and astonishment of all beholders. As the spirit of deathless fury gains ground, the frenzy becomes greater, and the whole mass are seized with unrestrainable ardour for the battle; and having thus produced their courage to order, they advance towards the foe generally, I believe, to run away as soon as they see him. Whole villages turn out as you pass, and stand like nude bronze statues on the mud walls of their villages, greeting you with smiles and I know not what strange words of welcome. They will bring out supplies of flour and grain, chickens and bananas, to give to the tired porters, or barter for pink beads, though what becomes of the tons of beads they obtain is a mystery, for they wear but few. I like these simple, good-hearted people—very children of Nature; and I hope that the influence which they will hereafter follow may be that of Europe, and not of the slave-hunter, who, I fear, is already getting a footing in their country. Leaving Kavirondo, we pass westwards to Usoga. No natural boundary divides the two countries, unless it be an insignificant stream, but a more complete change, both in the physical aspect of the country and in the people that inhabit it, it is impossible to conceive. From the open plains and grain-fields of Kavirondo you pass at a single step into a country of dense, endless banana groves; potatoes and casava take the place of millet and maize. From savages devoid of any clothing whatever you find yourself among a people clothed, man and woman alike, in the beautiful soft mbugu, made from the barks of various figs. The Usoga mbugu is dyed black; that of Uganda is of a bright brick-red. Chiefs wear it looped up over the right shoulder in a graceful and carefully arranged pleat, from which projects a long wand. The *tout ensemble* is not unlike an undergraduate's gown. The country is densely populated, and mile after mile leads through groves of bananas and constant villages. It is said (I know not on whose authority) that years ago the great Wahuma tribe, migrating southwards, overran the countries of Uganda and Unyoro, and founded the vast kingdom of Kitara,* which included these countries, as well as those dependent on them to the south. Traces of this immigration of Wahuma remain in both Unyoro and Uganda. The royal family of both countries is largely of Wahuma stock; a considerable number of the tribe are scattered through the land, and prior to the death of the cattle they were the herdsmen of the Waganda; but now they have gone I know not whither, and one sees few of them. This wave of immigration appears to have passed westwards of the Lake, and not to have crossed the Nile. Usoga is therefore entirely free from traces of the Wahuma. The Wasoga are a more primitive people than the Waganda, though identical with them in

* This name, Kitara, is a useful one. It is the retention of Kitara, not Uganda per se, that I advocate.

origin and character. They have not been subjected to the influences of European, or of Arab and coast visitors, as the Waganda have for many years. They are a very brave people, but are still, happily, armed only with their spears and shields, though they are eagerly endeavouring to procure firearms from every available source; and it is only by the superiority of their arms that the Waganda hold their suzerainty over them. The country is rich in flocks, and formerly owned great herds of cattle. Produce of all kinds is in great abundance, so that Usoga earned the title of the cook-pot of Uganda. There is no king of Usoga; the country, though small, is ruled by nearly a score of independent chiefs, each of whom, I believe, owes some sort of allegiance to some Uganda chief. The people are of an independent character; they detest the Waganda intensely, and are ever ready to try and shake off their yoke. Thus in the recent troubles in Uganda the Wasoga rose *en masse*. The chiefs are most cordial to Europeans, and welcome them, and are eager for their friendship, as in Uganda; but throughout all Kitara I believe the peasantry to be averse to all European interference, for they are blindly loyal to their kings and chiefs, and fear that the white men may undermine their power and prestige.

Uganda offers many marked characteristics, both in its geography and in its people. It is a country of low hills and valleys; throughout the majority of the country it would be hard to find an acre of level ground. The hills are of red marl, or marl-gravel, and shale, generally covered with pasture grass of a kind which, I think, is peculiar to these countries; and though a spear-grass, is apparently nutritious and good grazing. The valleys are generally of rich black soil, and most frequently the lowest part of the dip is a river swamp. These river swamps merit a word of description. Throughout Unyoro and Uganda almost every valley and dip contains this curious and wholly disagreeable phenomenon. The swamp varies from a few score of yards to a mile or more in breadth, usually being from half to three-quarters of a mile. There is a slight trickling current—but very slight; the river is choked with dense papyrus, with an undergrowth of marsh ferns, grass, reeds, &c. The water is usually the colour of coffee, and red with iron rust. Most of these swamps are of treacherous quagmire without bottom; and unless the roots of the papyrus form a sufficient foothold, it is necessary to cut down reeds and boughs of trees to effect a crossing. The constant wading through these swamps, often reaching nearly to the waist in black and sometimes fetid mud, is the chiefest disagreeable of travel in these countries, for they occur frequently at intervals of a mile or less, and can only be crossed at known spots, where the papyrus has been cut down and crossings prepared. It is a singular characteristic of these countries that, spite of their altitude and hilly characteristics, rushing water is rarely, almost never, to be seen. Thus, Uganda has a mean elevation of some 4200 feet, and borders the trough of the Victoria

Nyanza at 3700 feet only, and is a country full of hills and valleys. Kitagwenda, at about the same altitude, borders the Albert Edward Lake at 3300 feet. Unyoro, with more lofty hills and peaks of granite, with an altitude gradually increasing in the south, as you near the Albert Lake, to some 5300 feet, similarly borders the trough of the Albert, which has an elevation of only 2000 feet. Yet nowhere are these river swamps more frequent than here in South Unyoro at the highest altitudes. Every valley is a swamp winding round and round the hills, and running water is very rare. The Munobo and Mpanga are the only running streams in South Unyoro proper. I have dwelt upon this point because it appears to me of very great importance, both from a scientific and a practical point of view.

It is probably the denseness of the vegetation which clothes the lower slopes of the hills, and only allows the tropical downpour to percolate slowly to the valleys, which prevents the formation of running streams, while the dense masses of papyrus and water-growth in the valleys absorb a very great deal of the water, and impede the natural drainage. Practically, on the other hand, this configuration renders the country almost impassable—at least, in the rains—to animal transport, unless with a prohibitive amount of bridging and road-making. I was, therefore, fortunate in finding a line of road from the Victoria Lake across Buddu and Northern Ankole, to the lower slopes of Ruwenzori, and thence to the Albert, which is almost entirely free from these swamps, and would offer few difficulties as a transport route. It has the great incidental advantage of touching the great Albert Edward Lake and the Salt Lake, and so of tapping the produce of the districts which border the shores of both, and the produce which accumulates at the latter, in exchange for salt.

There is another interesting problem in connection with the drainage areas of these countries offered for solution—Whence comes the water to supply the enormous Lake Victoria? Throughout the British sphere, on the north and west of the lake, there is no single river, except the Nzoia, which is worthy of the name flowing into the Victoria. The Katonga—marked on the maps as a big river—is merely a broad papyrus swamp, across which I have walked absolutely dry-shod in the height of the rains, when every petty rivulet was an almost impassable morass. It is by no means so important a drainage as the Marengo; and all the endless river-swamps (including the Marengo) send their sluggish streams northwards to the Kafur and the Somerset Nile. Estimating the superficial area of the Victoria at 27,000 square miles, cut by the Equator, and at an altitude of about 3800 feet, it will be obvious what an enormous amount of evaporation must annually occur. And yet, spite of this evaporation, spite of the fact that all along its northern and half its western shores, from the Nzoia to the Kagera, there is no river running into it, and the drainage of the country, such

as it is, is flowing away from the lake, there issues from its north-western corner the magnificent Somerset Nile, a deep, broad, silent river, flowing away towards Egypt, a giant at its birth. The problem I allude to is, Whether the basins of the Nzoia—a comparatively small river, fordable except in the rains; the Kagera, at the juncture of the British and German territories; the Ngare Devash, from the Mau Hills, and of such other streams as may be yet undiscovered, carrying the drainage of that range to the Victoria, are sufficient in themselves to supply the vast drain on the lake due to evaporation, and yet to keep up the great body of surplus water carried northwards by the Nile. And in this connection it must be borne in mind that much of the rainfall on the Mau Hills is carried northwards by the Tigrish and the Lilwa to the Lake Baringo, much eastwards by various petty rivers, to the Lakes Naivasha, Nakuru, and Elmenteita, and doubtless very much southwards to the new lakes recently discovered between Kilima Njaro and the Victoria, near the north-west boundary of the German territory. Probably the main slope is to the Victoria, but not the *entire* drainage. Doubtless the water absorbed by evaporation is to a large extent returned direct to the lake in the form of rain, for it has appeared to me that the position of the lake and its enormous area have induced climatic conditions which constitute it the centre of the rainfall of these latitudes. If these be insufficient to account for the maintenance at a constant level of this vast inland sea, there remains the hypothesis that there is a subsoil drainage, and that continual springs form the ultimate sources of the mighty Nile.

In this connection I may note one other natural feature, which to a mind more capable than my own of estimating the possibility of this hypothesis may possibly lend corroborative evidence. I refer to the constant occurrence of hill-side swamps. These frequent swamps, or marshy lands on the sides of hills, often on a considerable gradient, must indicate, first, an absolutely impermeable clayey subsoil; and, second, an extremely tenacious surface-soil, held together by closely binding vegetation. Whether such conditions, more developed, would tend to the theory of a subsoil or intermediate drainage is a point I must leave to more competent theorists.

I have pointed out that the slope of Uganda and Usoga is toward the north, and not towards the lake westwards of the Nzoia. This of course produces the curious phenomenon that in passing westwards you will cross the Nzoia flowing south, and almost immediately afterwards, having passed over no noticeable change of contour, the next stream is found flowing in the contrary direction. The same general configuration is noticeable with regard to the Albert Lake. One naturally expects that to maintain these vast inland seas all the drainage of the country would be absorbed by them; and even so it would be a cause of wonder how the evaporation was compensated over an area

of water close to the Equator at an altitude of only 2000 feet, and the Nile, now a vast river, flowing northwards through 1000 miles of equatorial heat, without a single tributary to supply the waste till it reaches close to Khartum. Yet here again you shall stand on the Kavalli plateau and find every stream and rivulet running westwards to the Ituri, and thus through the Aruwimi and the Congo to the western coast. Further north the Welle and Oubangi, and other giant tributaries of the Congo, carry off the drainage of the country away from the Albert and away from the Nile.

The close of the year 1891 and the early part of 1892 were exceptional in the matter of rainfall. Usually in this part of Africa the lesser rains begin early in October and cease in the middle of December. From that time the heat and drought increase, and the grass dries up and is burnt, till in the beginning of March the greater rains set in, and a tropical downpour continues with few breaks till the end of May. Last October and November the lesser rains were unusually heavy, and continued with little intermission till the time of the regular rains in March. There was a little check, and then the rain continued up to the time I left Uganda, in the middle of June. Still they did not cease, and we found the rivers, which should have been running down, all abnormally high. We did not leave this zone of rain, or the rains did not cease (I know not which), till we descended from the Mau plateau at the end of July, and found there had been much drought in Masai-land and Kikuyu. The result was, that the Lake Victoria was some 6 feet perhaps above its ordinary level, and may probably rise still higher. I looked forward with interest to hear if this should have caused any appreciable change in the height of the Nile in Egypt. I found that unusual floods had occurred in September, this not being the time at which the usual high Nile, due principally to the floods poured down by the Atbara from Abyssinia, occurs; and apparently the water took about the same time to reach Egypt, travelling some 3000 miles, as it took me to reach the east coast, which I did on September 1st. This incident is not without its significance. Had I, in Uganda, been able to telegraph or heliograph the news of the abnormal rainfall, and the rise of the Victoria Lake, possibly steps might have been taken to prepare for the floods, and much of the damage caused might have been saved. Egyptian administrators may perhaps find herein a new argument for the retention of Uganda!

When going out to attack the Mahomedans in April, 1891, on the frontiers of Unyoro, and again in May, 1892, when I went to conduct the negotiations with them which eventually led to their repatriation, I had an opportunity of traversing a very considerable portion of Western Uganda, and so of verifying the general conclusions I had come to as regards the characteristics which I have just indicated of the country. It is, I think, a decidedly fertile country, capable of growing

anything; but the population live almost entirely on bananas and roots, sweet potatoes of various kinds, and casava. The banana is grown to great perfection, and the best varieties are extremely luscious, surpassing any I have seen in other countries. It is also cooked when green in a hundred ways, dried in the sun and pounded into flour, fermented and made into pombe, or *ender*. Wheat and rice have been successfully grown and tobacco from imported seed, and all of good quality; but in the cultivation of the vine for wine-making, and of coffee, I think more lucrative results may be hoped for unless the much-talked-of railway should be constructed.

The districts travelled through in April, 1891, when I marched against the Mohammedans, had not so far been traversed or mapped. In passing through Singo I discovered a lake—the Lake Isolt—at Mitiana, the capital. Passing southwards to Buddu, after the defeat of the Mohammedans, I traversed long valleys of good soil with scattered trees (*Lebbi*), generally speaking a good pasture-land, suitable for cereals, and, touching at the knoll of Kisozi, at the junction of the Katonga and Kyoja Rivers—which is marked by Mr. Stanley—I went due south to Bugaju. Thence I made a tour to the mouth of the Katonga to ascertain if it was adapted for a harbour, traversing the swamps which border the Lake Victoria. I here found a second small lake—Nabugabu—with a curious drainage into the Victoria, which I was told was originally an artificial canal for fishing purposes. Having found what I wanted near the small island of Luwambu, I returned to Bugaju.

The Waganda are a singularly intelligent people, excessively eager for knowledge of all kinds, whether it be of reading and writing, of religion, or of useful artisan trades. Those few who have had an opportunity of learning any trade have become most superior workmen. They will construct you a new stock to a rifle which you will hardly detect from that made by a London gun-maker. The Fundi Kisule, who learnt his art from Mackay, is an accomplished blacksmith and gunsmith, and will make a new spring or repair any damaged rifle with admirable workmanship. Their folding stools of rod iron, and their beautifully-turned-out spears, attest their ability as blacksmiths. When first I heard of the proposal to establish a Scottish Industrial Mission in East Africa, I eagerly advocated (in reply to a communication asking for my ideas on the subject, which I had the honour to receive), its location in Uganda. Boat-building, carpentry, and, indeed, any other artisan work, would be eagerly sought by them, I am confident; and the difficulty would be to limit, not to obtain, the necessary number of pupils. Their indigenous arts bear evidence both of their delicate handling and of their skill. I regret that I have not here specimens of the numerous articles made in the country to prove my point, but the few small things I have brought with me will, I think, indicate their

natural talent. The Waganda are a warlike people, and ever ready to go to battle. There are, I estimate, some 6000 guns at least in the country, the majority of which are muzzle-loaders, but with a considerable proportion of improved breach-loading firearms. They make plucky soldiers, but are difficult to teach the routine of discipline. I could give you many stories illustrative of their pluck, which have come under my own observation; but one will suffice. It is a tradition of the country that the leopard should not be shot, but be killed by hand. They are very large and fierce brutes, more like an Indian panther than the small Indian leopard, and they frequently kill and carry off men and women. When a leopard at the capital makes himself obnoxious in this way, the people turn out to knock him on the head; it is looked on as a rare bit of fun. He is driven out of the long grass or bush where he has taken shelter, to find himself between two long rows of men. He has to run the gauntlet, and each man strikes him with his club. Should he maul anyone, he is beaten off by the rest. Thus done to death, he is slung on a pole, and with much gusto and drum-beating is carried to the King, who may keep the skin, or give it to the chief who organised the hunt. When, after the recent fighting, Mwanga ran away, a leopard was thus killed, and, in the absence of the King, he was brought to Kampala, and laid in state before me. The Waganda are, moreover, an excessively litigious, argumentative people; and this, combined with their excitability and their pluck, render them an obviously difficult people to govern, the more so that they are excessively distrustful, and very untruthful. The intricacies of their system of land tenure, and the complicated division of sub-chieftainships, almost defy solution to any but a born Muganda, and are the source of endless quarrels and litigation. They have the keenest possible appreciation of justice and fair play, but the grounds on which they base their decisions are frequently so utterly foreign to our conceptions, that one never knows by what standard of discrimination any particular case is to be decided. Decisions which to a European seem harsh, or altogether beside the question, are accepted with acclamation as the most impartial justice; while what would recommend itself as fair to a European may not infrequently (should it militate against some old-established usage), be received in astonished silence. Pending a really thorough and complete knowledge of all the points involved in these land questions, I endeavoured always to find a solution acceptable to both parties, reserving my own more direct jurisdiction for criminal cases where the facts were patent.

Uganda is divided into ten provinces, and the ten chiefs who rule these districts entirely drop their personal names, and are called by the traditional title attached to those provinces. Of these the four largest and most important have separate titles. Thus, the chief of Chagwe is the Sekibobo; of Singo, the Mukwenda; of Buddu, the Pokino; and of

Bulamwezi, the Kangao. The remaining seven are called by the title of their province, viz., Kitunzi, Katambala, Kasuju, Mugema, Kago, and Kaima. Superior in rank to these ten governors of provinces are the Katikiro (the vizier and chief magistrate of Uganda, and the Kimbugwe). These two hold innumerable estates, scattered throughout all the provinces, the inhabitants of which are their serfs. Below these twelve chiefs—and yet in an almost inexplicable way in some cases holding a position superior to some of them—come innumerable other chiefs, holders of traditional offices at the court of the Kabaka. Of these the chief are the Mujasi, Kauta, Gwanika, Sebaganzi, Salo-Salo, and Gabunga (chief of the islands and canoes), and many others. Parallel with these—in some cases superior, in others inferior—are the holders of offices under the chiefs of provinces. Many of these have distinctive titles, assumed by the holder of the office, such as the Nyumtwo and Molondo of Chagwo, Kagole and Kalunda and Sunga of Buddu, etc. These again have their Katikiros, or Viziers, their Mujasis, or heads of their armies, their Sebagadzis, and other distinctive offices with separate titles. Outside these territorial chiefs and the holders of office there is a third important class. These are the offshoots of the royal family, with their separate traditional rights and separate series of dependent chiefs. These are the Mlangira (male relatives), Bambeja (female relatives), and include two important positions in the State, the Namasole, or King's mother (held by a royal lady in the event of the death of the real Queen-mother), and the Rubuga, or King's sister, an office also held by appointment. The Waganda themselves can form no table of precedence; one day they will tell you So-and-so is the bigger man; the next day they will contradict it. Yet all seem to have the clearest and most definite conception of the full powers, the exact standing, and the comparative importance of each and every rank and office. Possibly, though I have only outlined the question in the baldest, briefest way, this may in some degree indicate the complications of the subject—a subject with which is inextricably interwoven the system of land tenure. To the student of tradition—I had almost said of constitutional history—the origin of these systems, the derivation of the names of office, the gradual development of the functions of each, would form an interesting study, and from personal experience I can add that it would form no easy one.

The Waganda are fond of music, and you will hear their reed pipes or flutes from morning till night; yet, unlike Swahilis, or the Atonga, Ajawa, &c., of Lake Nyassa, it is almost impossible to teach them English tunes, and they have no conception of singing. The language of the drum is carried to a singular perfection. There are drums 4 feet high and 2½ feet in diameter, and there is every intermediate grade down to the size of a flower-pot. There is the drum-note of war, of peace, for marching, for halting, for curfew; even the orders to clean the

roads and such-like public notices are given by a few recognised taps, to me quite indistinguishable, but to the smallest Muganda boy conveying a definite and well-understood order. There are an infinity of musical instruments—hollow pieces of wood ranged in order, and emitting a series of notes when struck with a tiny mallet, and played like a zither, and many others, including banjos of all sizes. The one here was Mwanga's own, of which I took possession when we fought. These instruments are often, if not generally, made of, or ornamented with, snake-skins.

I should weary you were I to continue to talk of the ways of these curious people; but I cannot leave the Waganda without one word about their national institution, the mbugu. Every man and woman is dressed in an mbugu, or large piece of bark-cloth, except those big chiefs who can afford fine white linen. This "cloth" is made from the bark of a species of fig, and not from a species of acacia, as in Nyassa-land. There are many kinds of these figs, which are cultivated for the purpose. Each kind has a separate native name, and each kind produces a particular quality—superior or inferior—of mbugu. The tree is stripped of its bark, and is then bound round with the juicy stems of the banana torn into strips. After a short time these are discarded, and the tree apparently has suffered no hurt, and begins again to form a bark, which in due time will be again stripped. One class only, with a large leaf, and of an entirely different species, dies when its bark is removed. The largest trees rarely attain a diameter of one foot. The common mbugus are made from trees 6 inches in diameter. The bark is steeped and hammered out. Every little hole or rent is carefully cut out and a bit inserted and sewn in with marvellous neatness and exactitude. Finally, it is beaten with a mallet in which grooves are cut, to give it a ribbed appearance, and is dyed a rich orange colour. In Usoga it is invariably dyed black. Royal mbugus are beautifully done, and may measure some 12 feet square. The stuff is strong *with* the fibre, but easily torn against it. It is warm and excellent clothing in dry weather, but gets like a sheet of wet newspaper in the rain.

The Waganda have a recognised currency in simba, viz., cowries. These are essentially a money currency, being applied to no use, and merely employed as a token and a basis of valuation. The origin of this system and the source from which the cowries first came (for they are found nowhere in these lands), are curious matters of speculation. At the capital there are two regular markets, with officers to control them, collectors of the king's taxes on all produce which changes hands, viz., a small percentage on the cowrie value. Produce brought in from the country is sold here, and oxen slaughtered and sold retail, as in our butchers' shops.

In June, 1891, I left Uganda with the object of coming in touch

with the Sudanese refugees from the Equatorial Province, who had assembled at Kavalli's, on the south-west shore of the Albert Lake. Marching from near Masaka, the capital of Buddu, I traversed Northern Ankole, a district, hitherto unvisited by any European, though Mr. Stanley, in 1876, had travelled parallel to it within the boundaries of Uganda, and reaching the borders of Kitagwenda, proceeded south-west to the narrow channel or river which connects the upper lake of Rusanga with the main waters of the Albert Edward Lake. Crossing this narrow channel (at most 500 yards across) I camped in the hostile country of the Wasura, a tribe subject to Kabarega of Unyoro, and identified with the Wanyoro. Here I came upon Mr. Stanley's route at the Salt Lake; but since at this time I had seen neither his book nor maps, my journey, so far as I was concerned, was in the nature of entirely new exploration, though of course I had been anticipated in the discovery of the Albert Edward Lake and of Ruwenzori. The natives, too, being hostile, I met with no one who had seen Mr. Stanley, or could inform me of his route, or tell me of his exploits.

Buddu abounds in the river swamps which I have described; but the route from Bugaju, on the Lake, across to Marongo is very free of them. The western portion of Buddu, bordering on Ankole, is not thickly populated, being somewhat poorly watered; but it affords large areas for grazing, in which are found considerable quantities of game. Buddu is some 50 miles across from Victoria to the borders of Ankole. The small kingdom of Koki does not extend northwards to the Katonga co-terminous with the whole western boundary of Buddu, as has hitherto been shown on the maps. It is a very small state, lying to the south-west of Buddu, under a tributary king, Kamswaga, who pays his dues to Uganda through the Pokino chief of Buddu, as does Bwera, on the north-west, at the angle of the Katonga and Kyojia Rivers. The people of Koki are of Bantu origin, and are agricultural. Koki is bounded on the west by the Lake Kichera. Northern Ankole is not thickly populated. The king of the country and the ruling race are the Wahuma; but considerable numbers of Bantu tribes, offshoots from the Waganda, Wanyoro, and especially the Wa-Koki, are settled throughout the country. Before the cattle all died of the plague the Wahuma were a purely pastoral people, like the Masai, and such cultivation as existed in the country was entirely undertaken by the Bantu races; for the Wahuma are a hospitable people, unlike the Masai, and freely permit strangers to settle in their land. Thus, they gave shelter to the Christians for a year when they were driven out by the Mohammedans from Uganda, and also to numbers of the people of Toru. These latter were Wahuma under a Muhuma king, Nyika, who was ousted by Kabarega. Now in their distress and starvation the Wahuma are largely dependent on these Bantu settlers for sustenance though they are learning gradually to cultivate for themselves. Very

Large numbers died with their cattle, and the residue, unused to a vegetable diet, which thoroughly disagrees with them, are a gaunt, ill-fed race, generally subject to skin disease. They are a fine-looking people, with handsome faces, bony and often aquiline noses, clear-cut features, and thin lips. Their racial affinity is probably with the Somalis, and, possibly, the Gallas. Being exclusively nomadic, the villages are small, and the cultivation scanty. The country is an open undulating land of low hills and long valleys. *Acacia* is the common tree, and is very abundant. Pasture and fodder abound. On my route to the Albert Lake I passed many deep and almost symmetrically circular depressions like the crater of a volcano, or a dried-up pond. A few of these, as shown on the map, were tiny lakes no bigger than a mill-pond, but apparently of great depth, with clear blue water and all the characteristics of a lake. The alligator and great fish eagle haunted their waters. Others, again, were dry, the bottoms being perhaps 100 feet or more below the level of the surrounding country, which is about 4200 feet.

The composition of the hills is, as in Western Uganda, a red marl, while the valleys are of excellent soil. The origin, therefore, of these crater-basins and small lakes is hard to account for, as the country offers no indications of volcanic action.

The terrible plague which has spread inwards through East Africa has carried off millions of cattle, and has inflicted a terrible blow on the pastoral tribes. No such epidemic has visited Africa within the memory of man, though the plague of some thirty-five years ago worked a great destruction. Its action appears to have been extremely rapid—a violent purging, debility, death. I greatly regretted that no case with pronounced and unmistakable symptoms came under my own observation, for the virulent epidemic had invariably preceded me. My own cattle have died, presumably of this disease, but in an attenuated form—debility and gradual wasting away and refusal of all food were the only symptoms. As the disease is still spreading, I believe, to north and south, it would be a matter of enormous, almost incalculable, benefit to the natives were some means found to arrest its progress, and would save thousands of lives among the pastoral tribes. Moreover, the hides of these diseased cattle are being exported by tens of thousands, and it is quite within the bounds of possibility that we may find, when too late, that we have imported the germs of this fatal disease into England. Were a veterinary surgeon sent out to thoroughly examine and report upon the nature of the plague and its remedies, it is possible that good might result, while the expense would be infinitesimal in comparison to the object to be achieved. This plague has also practically exterminated all the buffalo, which formerly were to be met with in great herds. It has also attacked much of the game, especially the eland, and, I believe,

the pig (wart-hog). Some of the small antelope (especially the bush-buck) have suffered; but the waterbuck, hartebeest, and zebra appear to have enjoyed complete immunity. The giraffe has died out; but the elephant, rhinoceros, and hippo are untouched.

This route from the Victoria to the Albert Edward affords a good route for transport, and would, I think, offer few engineering difficulties for a railway. Reaching the borders of Kitagwenda there are two alternative routes; the one skirting Kitagwenda enters at once into a hilly and very difficult country; the other crosses two or more river swamps before the Lake is reached. In our up journey we followed the route which, ascending the Chigamagera Hills by a steep climb to an elevation of some 5000 feet, crosses a well-watered and rich table-land, and descends again to the valley of the Kitumi, the stream which forms the boundary of Kitagwenda. Thence, winding among lofty hills, often along narrow and precipitous paths, descending into deep gorges and reascending, we cross at right-angles the watershed from Ankole to the Albert Edward Lake, passing through the country of Kaihura, a vassal to Ntali of Ankole. At last we reach the edge of the escarpment, and descend to the great lacustrine plain of the Albert Edward. Already we have viewed several small new lakes, the Ruamiga being especially lovely in its scenery and surroundings, stretching its arms away among the overhanging rocks of the surrounding hills, a picture of solitude, with no dwellers around it. Two more small lakes, some 3 miles each in length, are dotted on the plain. This plain is 13 miles across from the hills to the Lake, and is on a dead level; it is treeless except for a low acacia scrub as we near the Lake and reach the villages of Kakule. These are a colony of fishermen, who live almost solely on the fish they catch, the salt they steal from the Salt Lake and exchange for produce, and the hippo they spear with harpoons headed with blocks of ambatch wood, as light as cork. Their canoes are unlike any I have seen in Africa, being made of thin boards sewn together, and the whole canoe is as pliable and yields as easily as basket-work.

Having ousted the Wasura, who are aliens in the country, and have treated most cruelly the aboriginal Wa-Usonbola, I built a fort on the narrow tongue of land which divides the Salt Lake from the Albert Edward. The country here is barren to a degree, and bare of vegetation, but for a few stunted euphorbia and cactus. Remains of ancient villages were visible; but owing to the cruelties of the Wasura, who, under a chief of Kabarega's, named Dukala, held the Salt Lake for that tyrant, these had long been deserted, and the country depopulated. It is, however, extremely healthy, and the water of the lake is excellent. It is a wonderfully beautiful lake at this spot. The shores run clean down to the rippling water, with little or no marginal swamp and reed beds to hide its outline and detract from its beauty. Green islands

covered with trees are studded about the foreground, and the deeply-indented bays add a picturesque variety. On the other side, as you stand in Fort George* is the deep crater-like cavity at the bottom of which lies the Salt Lake, whose water is of a deep claret-red. It is very shallow, and every stick and stone, and the banks on its margin, are encrusted with the crystal salt, exactly as you shall see a pond in England when a slight frost has fringed its edges with ice. The salt is excellent, white with a beautiful rose tint, and the natives come from great distances to barter food and produce for it.

Although the giant Ruwenzori lies behind it at no great distance, a perpetual haze obscures it, and even the closer peaks of Rusesse are very rarely visible. While my fort was in course of completion I made a rapid ten days' trip across the Semliki to the camp of the Manyema slave-raiders at Miala, who had been represented to me as being the Sudanese of whom I was in search. These men are the furthest southern detachment of Kilonga-Longa of Ipoto; they have ravaged the district round them, and are held in great dread by the swarming and helpless population among whom they have settled. They levy blackmail in ivory from the more distant posts to which they travel, but claim a monopoly of all within their reach around them. From time to time they invent a grievance and a quarrel, and fall upon some helpless tribe, and massacre large numbers of them and carry off the slaves they require. They treated me civilly, and, indeed, are not bad fellows—plucky and loyal, had they only been trained in a better school. But the slave-raiding Arab was their beau-ideal, and they saw no wrong or shame in their trade. I have, indeed, found that, of all the various African tribes included in the broad term Zanzibari, none were braver, none more trustworthy or more loyal, than the Manyema. They are a splendid material, but alas! are being perverted to the basest uses by that scum of all humanity, the so-called "Arab" slave-raider; so-called I say, for you shall find very many pure-bred Arabs most gentlemanly fellows. Your slave-raider is more usually a mongrel, the son of some poor slave girl by the fortieth cousin of a half-caste Arab. They sent to me, as they heard of my approach, a tiny girl-child as a present; it transpired she was a dwarf from the forests. Others they had caged like wild beasts, and they told me (which I can scarcely believe) that Emin Pasha, on his way past here, had commissioned them to catch them for him against his return.

I took the child, and with her a boy dwarf as a companion. They became the pets of the expedition, accompanied us eventually to Kampala, and two merrier, happier little folk I never saw; they are there still. Sejamkuru, the boy, in a rig-out of scarlet calico, acts as drummer-boy

* Named after Mr. George S. Mackenzie and Mr. George Wilson.

to the Zanzibari contingent on state occasions, and both are free to play about to their hearts' content. Like all young savages, the cook-house is their headquarters.

Miala was some distance in the Congo Free State, and beyond the British sphere of influence; I therefore marched due east, re-crossed the Semliki, visited Emin's camp at the foot of Ruwenzori, and crossing the spur of hills which runs down from the great mountain towards the lake at a point higher up than I had done before, I returned to my fort at the Salt Lake. The Semliki, where it issues from the Lake Albert Edward, is an insignificant river, and conveys no great body of water from that lake to the Albert. As it winds, however, along the western base of Ruwenzori, hundreds of streams pour the snow-water from the perpetual snows on Ruwenzori into its basin; and when it again emerges into the long valley which bears its name (once doubtless part of the Albert Lake), it is a broad, deep, and rapid river, bearing in drought or in monsoon alike a great body of water towards the Nile. In parts it affords some lovely scenes—cascades and falls in deep gorges, overhung with magnificent trees. Huge herds of elephants wander along its banks.

I have said that the Lake Albert Edward consists of two portions, the Mwutan-zigé (Barrier to Loonsts), viz., the Great Lake and the Ruango. This latter is in reality a separate lake, connected with Mwutan-zigé by a river, at most 500 yards across. Its general direction is north-east and south-west. There is no swamp around it except at the north-east end, where dense jungle and impenetrable marsh afford a home for great herds of elephant. It is at this point that the Rivers Wami and Mpanga, into which the countless streams to the south of them from Ruwenzori flow, bring their waters to the Lake. The gorge through which the latter flows is picturesque in the extreme, especially in the rains. The great body of water confined between its rock walls boils and eddies over the sunken rocks below. The gorge is some 700 feet deep, and is full of the tropical forest the orchids and the ferns, and the mosses, which are found in such a place where the damp vapours hang, and form a natural forcing-house.

Leaving at Fort George a small garrison, I marched along the north-eastern arm of the lake, with the mountain pile of Ruwenzori increasing rapidly in height on my left. Where a long bay of the lake runs out towards the mountains, I found Kabarega's forces drawn up to oppose me. We turned them out, and camped in their enormous camps, and so onwards, where the Mupuku, a large and almost impassable stream, comes out of a long gorge among the mountains. Here, with the Sebwe behind me, at the very foot of the loftiest snow peak of Ruwenzori, I built the Fort Edward,* and established the son of

* Named after General Sir Edward Lugard, G.C.B.

the old King Nyika, whom Kabarega had ousted from his country of Toru.

Leaving Mr. Stanley's route, I followed the eastern base of the Ruwenzori Mountain, crossing the endless streams which descend from its perpetual snows, and bear their clear, sparkling, icy-cold water to the Wami and Mpanga, and so to the Albert Edward. And here it is curious to note, that the drainage of the eastern Ruwenzori is not towards the Albert and so to the Nile, but to the southern lake, from which the only overflow is the Semliki, a river which at its exit probably conveys a lesser volume of water from the Lake than is contributed to it by the Mpanga alone. The country is wild, with dense elephant-grass 10 feet high and scrub bush obscuring the view, except where, as at Butindi and Butanuka, we emerge on the densely populated and cultivated areas. The ground rises gradually from the level of the Albert Edward, 3300 feet, to some 5300 feet at Kiaya. Here we descend into the head of a narrow valley, while the plateau we have been traversing trends away to our right, and forms the uplands of Unyoro, its bold outline appearing from the Semliki Valley and the Albert Lake like a lofty range of hills. The valley of Kiaya is extremely fertile, intersected with streams, and studded with banana groves and cultivation. I found here a small Waganda colony, who had left their country in the troublous times of war. The valley opens out as we pass along it, and winds among the hills, the giant mass of Ruwenzori still towering on our left. Between the edge of the plateau we descended and the base of Ruwenzori there is a deep trough, or gorge, the hills rising steep as it were from their own foundations, and disdaining connection with the plateau, which reaches to their very feet. Leaving Kiaya, we pass through a wild country of quartz and scrub jungle, bisected at right-angles by gigantic ravines of rich soil, in which are villages, forest, and cultivation: and so we reach the edge of this lower plateau, and look down on the Semliki Valley below us. Simultaneously the massive peaks of Ruwenzori slope down to lesser hills, and mingle with the plain. Opposite us appears a new range of mountains, increasing in height from south to north. Mountains they are, but, like those we leave behind us, they are more rightly the escarpment of the plateaus on which the sources of the Ituri, and the other great affluents of the Congo, take their rise; which, for convenience, we will call the Kavalli plateau. Crossing the plain and the Semliki, now a noble stream, passable only by canoes, which we found great difficulty in securing, being attacked once more by Kabarega's hostile rifles, we waded all day till nightfall through a pestilent swamp of dense reeds and giant grass, through which we pioneers forced our way with infinite toil, throwing ourselves bodily on the mass of vegetation, and forcing it down till we formed a way over it, waist deep in water. As one after another was completely exhausted with the violence of the physical exertion, a new hand would

take his place. The swamp wasps also occasionally attacked us, and I was right glad to gain dry ground just before the sun set and darkness fell. Such incidents sometimes occur in African travel.

Marching along the base of the Kavalli Hills, through a country little traversed by man, and following the paths made by elephant and hippo, through very dense high grass and patches of forest composed of the lovely flowering mistoanda, and many gorgeous flowering trees, we met no inhabitants till we came upon a small village of friendly hunters in the depths of a magnificent forest. Guided by them we ascended the hills, and ere long found ourselves at the headquarters of the Sudanese whom I had come to find. After some difficult negotiations with their leader, Selim Bey, the pith of which was to settle who was to be master, he or I, they agreed to be ready to follow me in some sixteen days. These people have no idea of hurry; but anxious about Uganda, I would allow no delay, and within the stipulated time they were ready to follow me. The Kavalli plateau was the site of Mr. Stanley's protracted camp, and has been fully described by him. Undulating hills, with sparse villages dotted here and there; parts afford good pasture, parts are covered with the 10-foot elephant-grass. Doubtless the loss of the cattle, and the immigration of these hordes of ruthless Sudanese, had denuded the country both of its inhabitants and its food. When I was there there was little of either. The plains along the valley of the Albert Lake are also thinly populated. A few small detached villages, whose inhabitants lived by fishing, and by washing a saline earth and preparing salt, which they sold to the people of the hills for food, were all that were to be met with. These wretched people groan under the tyranny of the despot of Unyoro. They dare neither own cattle or flocks, or even to crop, or food, for all would be taken from them by Kabarega. Indeed, they hardly dare call their lives their own. Periodical raids by the Wanyoro drive them for shelter to the depths of the forests or the recesses of the mountains; those who are not fortunate enough to fly in time, or are unable, by reason of age or sickness, are massacred or enslaved. Such is Kabarega's rule. They welcomed me, and begged me to live among them. I replied that I was about to place a barrier between them and their tyrant, and they should live in peace. Great areas of excellent pasture-land extend along the shores of the Albert Lake to where the hills impinge upon the Lake to the north. An excellent harbour is formed near the long promontory of Nyamsassi. Southwards of this the country becomes arid and sterile, covered with sparse jungle scrub, till it merges in the great swamp around the mouth of the Semliki. On October 5th I left Kavalli's with the vast following of the Sudanese, their wives and their children, their slaves and their followers. Sending an advance party by water, who rounded the mouth of the river in two canoes left me by the friendly chief, my blood-brother Katonzi, they

gained the further bank, to find that Kabarega, in order to prevent my return, had destroyed every canoe on the river. Katonzi's willing followers ferried us across—the work of many days—and one by one each individual of the refugees was counted as they landed, men, women, and children—8000 in all—besides the advance party, of some 200 more. With my Wahuma guides, my Waganda volunteers, and my old faithful followers, we must have numbered over 9000 souls.

So I brought down the Sudanese from Kavalli; and I built five forts from north to south from the Albert to the Albert Edward; and I located the Sudanese in them by regiments and companies; and I left De Winton in charge of Torn the country bordering the base of the Ruwenzori Range—with orders to protect these people, both from the licence of the Sudanese and from Kabarega. And the fugitive Wahuma came out from their hiding among the mountains, escaped from their slavery among the Wanyoro, or bade farewell to Ntali, who had sheltered them, and with great rejoicing recognised the boy Kasagama as their king.

But old men, chiefs of influence in the old time, came to me and said, "The people are eager to come to you. They have seen that you hurt neither man nor woman. They know Kasagama to be the true son of their old king, but they fear that you will go as Stanley went, and then there is only torture and death before them at the hands of Kabarega's armies. In old time the white men came to Mruli and Fauvera, in North Unyoro, and the people did not believe they had come to stay, and they would not accept them. But they built forts and stayed, so the people came. And one day they gathered up their things and went; and Kabarega killed all those people who had been friendly to them." And I replied, "Do as you prefer; but these lands are British. We have taken them by the agreement of the nations of Europe, and are come to stay." And when the people saw that we had built these forts and left these Sudanese, and a European was come to live among them, they doubted no longer that we meant to protect them, and place a barrier between them and Kabarega on the one hand, and the Manyema on the other. And De Winton wrote to me shortly afterwards and said they were escaping from their slavery in Unyoro, and coming in on every side by thousands, with great rejoicing.

And De Winton did as I had told him, and went round the country with Kasagama, and appointed chiefs to districts, and helped him to arrange the country in peace. And in this task this brave young officer died.

Before the reading of the paper the PRESIDENT said:—This being a special meeting of the Society, we do not begin our proceedings with the usual preliminaries, but it is my duty to read to you one or two letters we have received, and which will, I think, be listened to with interest. [Letters were read from

the Secretary of H.R.H. the Prince of Wales, His Grace the Archbishop of Canterbury, and Mr. H. M. Stanley.] And now I have no further preliminary than to point out to you that we are about to listen to a description of a country of the greatest possible interest and importance, the very centre of the waterways of Africa.

After the reading of the paper, the following discussion ensued:—

The PRESIDENT said: I think you will agree that Captain Lugard has steered with singular tact amongst the rocks and shallows through which he had to sail this evening, and I think you will have been struck not only by the general merits of his paper, but by the almost lapidary brevity and strength of his last two paragraphs. To me at least, when I read them yesterday, the turn of his phrases recalled in the most curious way, as I wrote to Mr. Kettle, the language of one of the most precious and venerable monuments of antiquity—I mean the inscription on the famous Moabite stone. Captain Lugard has the advantage of some 27 centuries of civilisation over King Mesha of Moab, and has taken advantage of his advantage; but he really seems to have gone to him for the style in which he has recounted his far more beneficent exploits, and I do not think he could have gone to a better model, so far as simplicity and directness of utterance are concerned. His last two paragraphs seem to me altogether too good for these degenerate days of paper; they should be stamped on bronze or graven on stone; and I invite all those who do us the honour of addressing us to imitate at once Captain Lugard's judicious avoidance of controversial questions, and the firm-knit conciseness of his closing sentences.

Captain PHILLIPS: I only arrived in England this evening, and had no idea I should be called upon to speak to such a large audience. I have listened with the greatest interest to Captain Lugard's account of the country he has traversed, and there is very little that I can add to it as regards description of the country. For the railway we have surveyed several routes from Mombasa to Lake Victoria Nyanza, and I think I may say that we have found a route that is both practicable and not costly. I am only sorry that Captain Macdonald, who was in charge of the railway survey, and carried out nearly the whole of the fieldwork of the survey, is not here to speak. He travelled back with us as far as Kikuyu, 200 miles from Mombasa, and there received orders which necessitated his going back to Uganda. I am sure, had he been here in my place, he would have said something more interesting and more to the point than I have done.

Mr. RAVENSTEIN felt sure they had listened with pleasure and profit to Captain Lugard's paper. He trusted that what they had heard from Captain Lugard would confirm them more than ever in the determination that Uganda should not be withdrawn from the civilising influences of a power like England. Many subjects referred to in the paper invited discussion. One point more especially struck him. Captain Lugard stated that several of the small lakes he passed were inhabited by crocodiles, whilst Dr. Stuhlmann, who passed along the western shore of the neighbouring Albert Edward, mentions it as a curiosity that no such animals were to be found in that large lake. Was Dr. Stuhlmann mistaken? Mr. ARNOT, who was present at the meeting, suggested that the crocodiles preferred the warm water of these small lakes to the colder water of the larger lake. As to Captain Lugard's maps, he could speak with confidence. Captain Lugard had not gone out as a scientific explorer, and his time had been fully occupied with other matters of more immediate interest to his employers. Yet his manuscript maps were marvels of minuteness. They contain copious notes on the country, distances, and bearings from day to day, and with the help of such latitudes as were due to Stanley, Stuhlmann, and a few others, they would enable geographers to present a fairly accurate picture of that remarkable mountain district of Ruwenzori which

Captain Lugard had encompassed. Captain Lugard, by putting all he had done before them, might be said to have deliberately placed himself in a glass house; but he could assure them that that glass house was a very strong one, and that it would take heavy stones to break any holes in it. He had been asked what "Ibea" meant. That name had been formed from the initial letters of "Imperial British East Africa" by Mr. George Mackenzie, and he quite agreed with a writer in 'Petermann's Mittheilungen,' that it was a "very beautiful" name. He ventured to suggest to the German East Africa Company to call their territory according to the same fashion "Dua." Adding a Kiswahili prefix or suffix "u" or "ni," they would have "Udwa" or "Dwani," which was nearly as pretty a word as "Ibea."

MR. GEORGE S. MACKENZIE: I assure you this is quite an unexpected honour. I had no idea the President would call upon me to say any words to you this evening, and I do not quite understand on what grounds I am called, as the country of Uganda is one with which I am not personally acquainted, my duties having confined me entirely to the coast-line, which, probably, you all know as well as I do. Captain Lugard and I have had a great deal in common in so far as regards the suppression of the slave trade in the district. I may tell you that Captain Lugard went out to Africa with me on my second visit, his object being, I think, merely to use up three months' leave. He has shown his devotion to the country by the objects he has had in view, and which he has so very admirably carried out. It has been a matter of very great pleasure to the directors of the Company to have so able and energetic a man, who had no desire for self-glorification in any way whatever. This is the leading characteristic of Captain Lugard's work. He has done very much in Uganda, and along the confines of Uganda, in suppressing the slave trade, and I sincerely trust that the work, of which he has laid the foundation there, may not be thrown away entirely. But not only in Uganda and Unyoro has this work been done by Captain Lugard; for he has told you how he formed stockades along the whole route, from the coast up to the extreme point of his journey, and along the whole route he has taken some measures or other to free thousands of slaves in that country. He has made the task very easy for us now if we will only carry out some of the recommendations which he is likely to put before us. But on this subject I am unable to say more to you here, as this is a meeting of the Royal Geographical Society; but at some future time I hope Captain Lugard will address us on a subject in which I take a very great interest indeed, viz., the total emancipation of the slaves in British East Africa.

The PRESIDENT, in conclusion, proposed a vote of thanks to Captain Lugard for his admirable paper, which was carried by acclamation.

The Öræfa Jökull, and its First Ascent.

By FREDK. W. W. HOWELL, Esq.

ON the south-east coast of Iceland, 160 miles east of Reykjavik, and 83 south-west of Djúpivögr, lies the Öræfa Jökull. Its southern spurs are washed by the waves of the North Atlantic; its northern are rooted in the vast mass of the Vatna Jökull. From the enormous snow-fields of the Vatna—two great glaciers sweep down to sea-level on the east the Breiðamerkr, and on the west the Skeiðarar—enclosing the

Öræfa within their icy grasp. The average width of each of these two glaciers is about 12 miles, and the bulk of the necessarily large volume of water flowing from them swirls into the ocean through two terrible rivers, the Jökulsá and the Skeiðará. The difficulty of access due to these two canals, remoteness from ports of call, and the evil reputation of the draining rivers, has doubtless much to do with the fact that, up to 1891, there is no record of a successful ascent. But the difficulty does not end here, for the Öræfa offers an exceedingly cold shoulder to every moisture-laden current of air from the ocean, and so provides a condenser which, from a mountaineering point of view, is only too frequently in active operation. It was at a little promontory due south of the Öræfa that Ingolf, one of the first two permanent colonists of the island, spent his first three years, from 874 to 877, and in the name of that rock, Ingolfshöfði, his memory abides. It appears that at this early period the valleys to the east and the west by no means presented the aspect of desolation they do to-day. Indeed, the valley now occupied by the Breiðamerkr glacier was covered with grass and dotted with woods until the middle of the fourteenth century, when, it is said, vast portions of the ice-fields descended and filled it up. About the same time, i.e. in 1341, other portions appear to have been suddenly liquefied; the resulting floods poured down the Öræfa's western slopes, and devastated five fertile parishes, sweeping "forty farms and two churches" into the sea. Whether the name Öræfa Jökull—*Desert Glacier Mountain*—was bestowed then or previously, it was certainly well deserved between 1340 and 1350. Further outbreaks in 1598 and 1727, mainly of ashes or of water, completed the desolation.

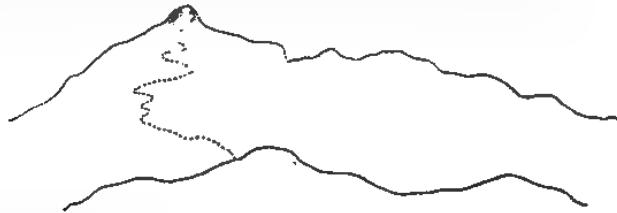
The first attempt to penetrate the snow-fields appears to have been made by Mr. Paulson, who, according to the account in Henderson's 'Iceland,' left "Qvisker (a small solitary farm at the eastern base of the mountain) at 5.45 in the morning of August 11th, 1794." He proceeds to say: "We at length gained the south-east peak of the Yokul at 11.45 A.M., and found that, in conjunction with the three or four other peaks to the west and north, it describes the side of an immensely large crater of a circular form. These peaks on the summit of the Yokul are so precipitous that the mass of ice has in different places disengaged itself, and fallen down from them, leaving a number of black calcined rocks, the tops of which are covered with hats of frozen snow, and for the most part inaccessible, as a single false step would inevitably precipitate the traveller into the unfathomable chasms at their base. We again reached Qvisker much fatigued about 4.30 in the afternoon."

From this account it does not appear that Mr. Paulson made any attempt upon these peaks with "hats." Moreover, he gives the difference between the barometric height at Qvisker, and the highest at 5.101", which, allowing for temperature, gives under 6000 feet, while the

trigonometric height of the Öræfa, according to Gunnlangsson's map, published in 1845, is 6241 Danish feet, equivalent to 6426 English.

In 1861, Mr. E. T. Holland, B.A., accompanied by Mr. Shepherd, crossed Southern Iceland, and in 'Peaks, Passes, and Glaciers,' Second Series, Vol. I., an extremely interesting account may be found of a determined attack made by them upon our peak.

Mr. Holland tells us how he left Knappavellir, a farm situated only three or four miles N.E. from the most southerly point of the Jökull, at 8.30 A.M. on August 12th, and at 1.30 P.M. had reached "a narrow ledge of snow at the bottom of a steep snow-bank, which clung to the rocks at the foot of the Knapp, or dome." These rocks he states to be "50 or 60 feet high, and up them he managed to climb about 15 feet, but found it impossible to climb higher, owing to the very loose and broken state of the laminated shelves." They turned back at 2.5, left the ice at 3.15, and regained Knappavellir at 5 o'clock. Of the "crater" mentioned by Mr. Paulson, nothing was seen.



ÖRÆFA JÖKULL, FROM PLATEAU ABOVE KNAPPA-VELLIR, according to Mr. Holland. (Copied from 'Peaks, Passes, and Glaciers,' Second Ser. Vol. I. p. 50.) Dotted line = Mr. Holland's route.

Compare with above—

True summit of Öræfa Jökull
not visible.

Glacier descending from southern snow slopes of Öræfa Jökull to the east of Knappavellir, from photograph by Mr. Fredk. W. W. Howell; taken at base of mountain, camera slightly tilted, so that angle of glacier is really sharper than in sketch.



It will be advisable, perhaps, to state at once that, from the result of my own observations, it is now clear that Mr. Holland's "Knapp" was not the summit at all, and that, if he had succeeded in surmounting the rocks in question, it would have been only to discover that about

two and a half miles of snow-fields yet lay between him and the actual peak.

My first attempt to unravel the secret of the mountain was made in the summer of 1890. Leaving Granton on July 29th, I reached Seydisfjörðr, on the east coast of Iceland, on August 2nd, and, after a grand journey over the mountains and by the fjords of the picturesque south-east, arrived at Bjarnanes on the 8th. A letter of introduction from Mr. Magnusson, of Cambridge, secured a hearty welcome from Sjera Jón Jónsson, by whose advice I proceeded at once to Sandfell, on the west of the Örefa Jökull, which was reached on the 11th. It was this district which bore the full brunt of the waterflood already mentioned, and nothing whatever of the village remains except the church and parsonage. To say that I was well treated by the Pastor, Sjera Olavur Magnusson, would be to express but little of the constant kindness I received from himself and his excellent wife.

On the 12th three men were obtained from Svinafell (Swinefell), a tiny village a couple of miles to the north—Páll Jónsson, Thorlakur Thorlaksson, and Jón Sigurdsson; and with them the ascent commenced at 4 p.m. in a drizzling rain. According to Gunnlaugsson's map, two peaks rise from the ridge of the volcano, one to the north, and a double one to the south, to which latter he attaches the name of the Knappur. A Danish chart, however, which I saw on the *Thyra*, left the twin peaks unnamed, and suggested that the culminating point would be the most northerly of the two. Towards it our course was therefore directed, and steering by compass in a north-north-easterly direction, we crossed a spur of the hill called Sandfell, and emerged into the Hvannadal, through which descends the Fall Jökull. This we found to be greatly crevassed; but maintaining as straight a line as possible through the fog and rain, we crossed it diagonally, and struck a tongue of rock forming its north-western boundary, upon which, at 9 o'clock, we camped at a height of 2000 feet. The only shelter we could find was a rock overhanging a couple of feet or so, under which we hid our heads, ostrich fashion, and boiled a tin of soup by the aid of a spirit lamp. The roar of avalanches across the valley, and the patter of the rain drops on a waterproof which covered the rest of us, formed the mountain's lullaby. Resuming the same course in the morning, we arrived at the summit of the north-east ridge of the Hvannadal at 8 o'clock, at an elevation of 3000 feet. The ridge which unites the mass of Svinafell to the backbone of the Örefa swings round from the north-west, and is here united to the spur on which we found ourselves.

As we neared the edge a magnificent sight presented itself. We stood on the brink of a precipice not far short of 1000 feet in depth, at the foot of which there flowed a glacier of the most perfect form away to the north and then to the west, describing a curve of exquisite beauty, until we lost sight of it behind the Svinafell ridge.

Turning sharply to the south-east, we ascended the snowy sides of a hill forming part of the arête, and reached its summit at about 10 o'clock. Height, a little under 5000 feet. Progress to the south-east



was stopped by another precipice; we had therefore to retrace our steps for a short distance, and, bearing away to the east, descend to the névé of the afore-mentioned glacier, now only a few feet below the ridge on which we stood. The upper edge had curled back from the crumbling

abaly rock like a wave beaten back from a cliff. Resuming our south-east course, we ploughed through the loose snow with an arête on our right, whose shattered peaks shot up here and there through the snow like obelisks. The wind had increased to an alarming extent, and snow began to fall heavily, so that the work was extremely hard, until at 1-30 we found we had attained the head of the slopes at an altitude exceeding 6000 feet. On our right rose a precipice of some 50 or 60 feet, with a heavy snow-cap above. We were separated from it by a deep hergeschrund, and as two of us had already been blown down on to the snow, it would have been madness to have attempted to reach the ridge in the storm then raging; I therefore reluctantly gave the word to return. We regained our camp at 4-30, left it at 6, and arrived at Sandföll at 10-30 p.m.

In the summer of 1891 I returned, this time with a friend, Mr. Coulthard, jun. Landing, as before, at Seydisfjörðr, we travelled westward until we arrived at Reynivellir, where the Breiðamerkr Jokull begins. On the morning of August 14th we had a glorious view of the vast snow-fields of the Örefa. Two great ridges, one on each side of the summit, sweep west, south-west, and finally south, their grand curves enclosing a glacier whose foot reaches the western end of the Breiðamerkr. A few rocks pierce the névé of this valley high up towards its south-west corner. Leaving Reynivellir about 1 p.m., we reached the vicinity of the Jokulsá at 5, expecting to cross it, as I had done the year before, on the ice a few yards above the spot where it issues from a glacier tunnel. Owing, however, to the unusual warmth of the weather, that crossing-place was no longer available, and for 3½ hours we drove, or rode, our ponies, as the state of the ice permitted, for 5 English miles up the eastern margin of the medial moraine until we reached a depression in the ice ridge, through which, with considerable difficulty, especially on the descent, we succeeded in passing the cavalcade. The spot was 800 feet above the glacier's foot, so that previous estimates which have placed the elevation of the Breiðamerkr at 200 feet or so are distinctly too low; moreover a gradual rise continued far above our crossing-place, and the height cannot therefore be less than 1000 feet. However, these previous estimates have, I believe, been made only from the plain, and it affords no fair vantage-ground. At a distance of 4 or 5 miles to the N.W. and N.N.W. there rose several fine peaks, from which the stones and *débris* on the moraine we were crossing had evidently been derived. The rounded head of the Örefa Jokull lay between S.W. and W.S.W. of us, and its northern spur, ending in a huge buttress, stretched so far towards the snows of the Vatna Jokull, that the total length of the ridge from north to south must be 14 or 15 miles. As we did not regain the Sandr till nearly 11 p.m., it may easily be imagined that the last mile or two of the descent proved somewhat anxious work, as the shades of evening fell, and found us still

threading our way among the innumerable ice-cones which cover the surface, or leading our ponies over the small crevasses which intersect it. At 3 a.m. we arrived at Krisker, and on the night of the 15th at Sandfell, my old headquarters.

As we returned from church on the 16th, we chose a path which led us out some distance to the west beyond the stone tracks, and over marshes where the footing for the ponies was soft and the going delightful. From this point it was easy to see that a great advantage would be gained by ascending the hill Sandfell behind the parsonage, between the Hof valley and the Hvannadal, since from its summit a tongue of rocks ran far up into the snowfields to the east, and offered a route entirely free from glacier difficulties. My friend the pastor, and a farmer from Hof who rode with us, pointed out a mass of black rocks to the south-east of Sandfell, and agreed that it was the "Knappr," or Button.

By 2.30 on Monday morning breakfast was ready, and as my three companions of the last expedition were already in attendance, packing was concluded by 3.30. At 4 we set out. It was chilly, and somewhat cloudy, but nevertheless, there seemed to be promise of a fine day. Bar. 29.4 = 400 feet, but Sandfell does not lie more than 200 feet above sea-level.

In order to avoid the precipitous rocks behind the parsonage, we here slightly to the north, until in about half an hour we were able to look down into a little gorge, the side of which displayed mounds of varied colours, reds and yellows; here we inclined south, so as to put ourselves again into the E.N.E. line we intended to pursue from Sandfell. The surface was very rough—red cinder mixed with broken basaltic lavas. The sun rose over the ridges in front about 5 o'clock, and by 5.45 we had gained the summit of Sandfell, nearly 2000 feet, and could look down into the gorge in which the Hof's Jokull lies. Its upper portion is double, but under Hofsfjall the two portions unite.

At 7 o'clock we had reached an elevation of 3000 feet; on our left were long ridges of ochreous cinder with patches of pumice, while pieces of obsidian of all sizes frequently occurred on the broad ridge we were traversing. High up in front was the Knappr, surrounded by wide snowfields, glistening in the sunlight. From them fell away on our right the upper ice fall of the Hof's Jokull. This had been covered with a thick layer of snow, and as the ridges broke away they had taken also their snow coverings, whose sharp clear-cut edges, rising tier above tier, presented a picture of extreme beauty. We now began to find the hollows of the ridge filled with snow, and shortly after 8 o'clock we stopped for an hour for a second breakfast at 3800 feet.

At 10 o'clock we left the rocks and roped; but before an hour was over my friend found it necessary to return, Jón Sigurdsson

accompanying him. Resuming my position at the head of the rope, with Pall in the centre, and Thorlakur behind, I made for the stately pile of rock (now to the east) which had been our goal for so long, but in consequence of the number of the crevasses met with, found it better to bear away slightly north-east. At 1 o'clock we gained the top of the snow slopes at 5300 feet. The whole surface was covered with innumerable and exquisitely beautiful ice-crystals attached horizontally to the honeycombed surface of the snow, and pointing to windward. We found that one of these, together with a piece of kola candy and a meat lozenge, formed a most invigorating and refreshing stimulant.

To the north there rose from the snowy ridge a huge hummock-like mass, partly concealed by a mist which was gathering round it. We, however, turned south, and in an hour reached a sharp knife edge of ice which led up to the Knapp from the north-east. This edge was broken clean through by a wedge-shaped cleft, but it offered the only possible means of approach, since the perpendicular rock walls elsewhere were cut off by bergschruns, and, indeed, were evidently impracticable in themselves. Descending into the cleft, I prepared to cut a way up the slope which led right up to the ice-cap lying upon the north-east corner of the rocks.

Here the guides stopped, and refused to follow any further. However, as the ice was perfectly good, I cast off the rope, and at 4 o'clock reached the crest, only, however, to discover what I had suspected for some time—that this so-called Knapp was by no means the summit. Its height was 5800 feet.

Not far off, towards the east, a singular peak pierced the snowfields, and this, with the one on which I stood, formed the twin peaks of the map. They are both prominent objects as seen from the south, especially from the neighbourhood of Knappavellir, in the direction of which the snowfields fell rapidly away from the southern base of the cliffs beneath me. (See sketch on page 843.)

Retracing my steps as quickly as was consistent with safety, I rejoined the men. We climbed back from the cleft to the sharp ridge, and descended to the snowfields. Provisions were unpacked, but before we could touch them we were chilled through and through by the cold blasts which swept up from the Breidamerkr. However, we secured a shelter by driving our alpenstocks into the snow and hanging a cowskin coat or two over them. Tea over, we set out again. Poor Pall expected an immediate descent to Sindfell, and several long-drawn "Ahs" expressed his feelings when he discovered that I was determined to reach the hummock-like pile of rock to the north which he had seen in the afternoon, and which I was now certain must be the summit. Like so many Icelandic mountains, the Örefa has three peaks; the most

northerly was the first reached by us in 1890; the most southerly we had just left. It was 5 o'clock, a sharp sleet was beginning to fall, and a couple of miles of snowfield had to be traversed. We did this in an hour. During the latter half we had on our left a grand crevasse nearly a mile in length.

From time to time the peak we were approaching was hidden by the sleet, but during the clearer intervals I noticed that in form it resembled a lion, with head pointing east. The nose and neck form the black spot, just under the snow-cap, visible so plainly from Reykivellir, and indeed from any part of Southern Iceland between the Vestrahorn and the Örfæa. A pinnacle of bare black rock to the west answers very well for the lion's tail. The ascent of his flank cost us an hour and a half, though the men worked well, for the snow-heaps at the bottom were exceedingly steep, and the crevasses above numerous and awkward. Nevertheless, the superb beauty of these crevasses amply repaid us for the labour. So steep was the slope that the front lip of each fell considerably below the rear, so that we had frequently to walk some distance right or left before we could pass from the top of one ice-wall to that of another. In many cases the edges of the upper lips were lined with fringes of magnificent icicles, which hung far down into the crevasses between. However, now at a place where the ice-walls joined each other, now over a natural bridge, and once where my camera legs had to be called into use to strengthen a doubtful snow wreath, we gradually rose until we reached the summit of the ridge. Turning to the east, we attained the rounded summit of the final snow-cap at 7.30—6400 feet.

It had been freezing for some time; and as snow and sleet continued to fall, our view was very limited; moreover, it was so late that prudence dictated an immediate descent. At 7.45 we left the peak, Thorlakur leading, and right well he performed the task of tracking our footsteps. We left the main ridge of the Örfæa at 9, and traversing the maze of crevasses as quickly as possible, gained the rocks again at 10.30. The rest of the journey was a rough-and-tumble scramble over the Sandfell scoria until we arrived at the parsonage at 1.30 A.M. We had seen nothing whatever of a "crater." Doubtless it has been filled up with ice long ago.

After a day's rest, we left for Svínafell, and on the following morning rode some 4 or 5 miles towards Skaptafell, where in the nooks and crannies of Hafrafell a few birches and a mountain ash or two succeed in weathering the northern winter. Indeed, at intervals there is a little brushwood nearly all the way to the Jökulfell, except of course where another great glacier sweeps down between Skaptafell and Jökulfell. Iceland moss is said to abound on these latter hills, though on the Örfæa there is little or none.

A fine field for further exploration is offered to the north-east of
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Skaptafell, and quarters could no doubt be found in one or other of the two or three farms on its sides. Several ridges, with fine glaciers between, run in a north-easterly direction towards the uniting point of the Öræfa and the Vatna Jökull.

The Cordillera of Bogotá, Colombian Andes.

THE results of Dr. Hettner's journey in 1882-4, and of a careful study of previously-existing materials, has appeared as a supplementary number of 'Petermann's Mittheilungen.' A glance at the history of exploration since the Spanish Conquest, with which the brochure opens, shows that much still remains to be done before we can possess a complete knowledge of the physical geography of the country. That conquest disclosed the broad outlines within half a century; but the time that has elapsed since has been broken only by spasmodic outbursts of activity. The journeys of Humboldt (1801), Boussingault (1822), of Hermann Karsten (between 1850 and 1860), and the surveys of the Italian Colazzi (1850-59), have done most of all to extend our knowledge. The last named carried out under the orders of General Mosquera, the only organised survey of the country as a whole that has yet been attempted, and which still forms the groundwork for the mapping of Colombia.

Unlike the two more westerly chains of the Colombian Andes, which are direct continuations of those of Ecuador, the Cordillera of Bogotá, with which we have exclusively to deal, seems to take its origin only in about 1° N. lat. Its southern portion is very imperfectly known, but forms, apparently, a single chain; while the northern part widens out, and forms several parallel ridges, reproducing, on a small scale, the main features of the Andes as a whole. While the eastern side slopes down regularly to the great plain of the Amazon and Orinoco, the western is more complicated, being marked by an alternation of longitudinal ridges and depressions, the latter often divided up by low transverse saddles into a succession of river-basins, the streams in turn breaking through the bounding ridges. The popular division by the inhabitants into zones of temperature, viz., *Tierra Caliente*, *Templada*, *Fria* and *Páramos*, or cold mountain summits, corresponds pretty accurately with that into zones of altitude, respectively under 3250, 6500, 9750 feet, and higher. This last division forms long-extended lines of high ground, sometimes single, sometimes two, or even three parallel, keeping on the whole rather to the eastern side of the range, the slope on that side being steeper. The easternmost and longest-continued line culminates in the snowy range of Cogui (17,400 feet), just at the point where it takes a sudden bend from a north-north-east to a north direction. In the interior parts of the range are intercalated elevated plains, whose bounding walls fall steeply on the outside, and look like castles standing up from the lower grounds. The geological structure is marked (in contrast to that of the western chains), firstly, by the absence of volcanic rock; secondly, by the slight extent and small variety of the older crystalline rocks which are entirely wanting in the south. Of sedimentary formations very few occur except the Cretaceous, and this, too, of a remarkably similar character throughout. The chains in the south-west resemble the Swiss Jura, in being formed by a regular succession of synclinal and anticlinal folds, in which all the chalk and gault

formations of the range appear. In the latitude of Bogotá, between these and the main axis to the east is interposed the high plain of that name, with its numerous ridges projecting like peninsulas at all angles, or rising like islands from its surface. These belong only to the upper series of the chalk. The main chain (here also the water-parting) comes last, and shows much less regularity in the arrangement of the ridges and strata. Further north (between 5° and 6° N. lat.) we find a second table-land (that of the source of the Sogamoso), intercalated west of the main axis, so that here four successive zones appear. For details as to geological structure we must refer to Dr. Hettner's work.

The rivers of the range belong to four different systems, viz., on the east, those of the Amazon and Orinoco; on the north, that of the Rio Catatumbo, flowing into Lake Maracaibo; and on the west, that of the Magdalena, whose great longitudinal valley divides our chain from the central range of the Andes. In accordance with the mountain structure, we find a simpler system of streams on the east, mostly flowing down in transverse valleys from the highest ridge. On the west the arrangement is more complex, the longitudinal valleys or valley systems already spoken of being the rule, while a subordinate water-parting, a continuation of the diagonal portion of the main watershed of the range, divides the streams flowing respectively north and south. This seems typical of a folded range, and again recalls the Swiss Jura. The principal streams on this side are the Bogotá from the angle between the two water-partings, which also receives tributaries from an opposite or south direction, and the Sogamoso, whose two main arms penetrate into the inmost recesses of the range. While these longitudinal valleys are usually the result of the mountain structure (synclinal, anticlinal, and isoclinal occur, and some are at the junction of stratified and crystalline rocks), the transverse valleys are usually simply the result of erosion. The course of the streams is sometimes sluggish on the high plains, but becomes very rapid when it leaves them, carrying along huge blocks, forming waterfalls and narrow gorges, or passing underground or beneath vast accumulations of rock. Narrow gorges occur principally in the transverse valleys which cut through high ridges, and in those excavated in nearly horizontal strata. The streams become again placid and navigable only near their exit from the mountains.

One of the most remarkable phenomena of the range is the great number of terraces elevated above the present level of the rivers, and composed of shingle with interspersed boulders of the kind called by the Germans "Schotter." Often a succession of these, now separated by deep-cut channels, can be seen to have once been united, and are, in fact, the remains of old shingle plains. They seem most abundant in wide basins with narrow outlets, where there would be most room for their accumulation. To the question what was the origin of these deposits, Dr. Hettner replies that their even slope in the direction of the rivers' course shows that they were not the beds of lakes. The idea that they owe their origin to glaciers is contradicted by the fact that they occur chiefly in the lower valleys, while glaciers can at no time have reached lower than 8200 feet. The stratification and rounding of the materials seem to prove them river deposits. The high plains already mentioned form another notable feature. Of these there are three larger and numberless smaller, the larger all occurring between 8200 and 8500 feet, while all come between 6500 and 9500. The surface is composed of peat, or of gravel, sand, and clay. One large lake and many pools are found on them, their shores passing in some cases gradually into peat bogs, composed chiefly of aquatic plants. The existing lakes of Tota and Suesca bear much analogy to these high plains, and it seems probable that these latter were originally lakes also, but have been drained by the wearing away of the mountain wall. As to their origin, the

most probable explanation is that which connects their formation with that of the mountains themselves; the smaller lakes at greater altitudes may, however, be due to glacier action. At the present day glaciers are found only on the chain of Cocui. Moraines, however, reach far below (for some distance they are so recent that vegetation has not yet taken root), and show their greater size in former times. A consolidated clay with angular blocks of sandstone also occurs, which may be a glacier product.

Of minerals, good emeralds are now obtained from one place only. Very little gold and silver occur owing to the scarcity of crystalline rocks, but copper, coal, and iron are found (the two last near together), as also very important deposits of salt. Mineral and hot springs are very numerous and various.

The yearly range of temperature shows a surprisingly small variation, and it may be said that there is no yearly temperature curve at all. The daily range is of course greater. At Medellín (4900 feet above the sea), the mean of five years (1875-9) gave the highest in the year as 85° F., and the lowest as 56·5°. Dr. Hettner endeavoured to fix a definite scale of diminution according to altitude, and found that it may be considered as about 1° F. in 330 feet. The Cordillera of Bogotá comes within the limits of two separate climatic regions—that of equatorial rain, in which we find two rainy and two dry seasons in the year; and that of tropical rain further north, where the two rainy seasons come so near together that one dry season is minimised and the other proportionately increased. The boundary between the two regions comes much further south on the east than on the west side, the cause being that the plains on the east are more exposed to the action of the trade wind. The water-parting forms also as it were a climate-parting between the two sides.

Forests as a rule require an evenly-distributed rainfall; therefore we find the western lowlands in the region of equatorial rain forest-clad, while those to the east are bare savannahs. The greater part of the outer mountain slopes on both sides are covered with primeval forest, and an extensive one stretches away north from near Cúcuta to Lake Maracató. The inner parts of the range, on the contrary, in accord with the lesser rainfall, are much bare on the whole. The forest is a true mixed tropical one up to its highest limits, there being no zone of conifers in the higher regions, as, e.g., in South Brazil. The species, however, vary at different altitudes. Palms reach about 3300 feet, tree-ferns 6500 feet, and the genuine cinchona trees from 4900 to 9500 feet. Evergreen oaks are found upwards from about 5500 feet, while 10,000 feet is about the limit of continuous forest. A lighter kind of wood, made up mainly of mimosas, also occurs, as well as isolated patches of palms, &c., on otherwise bare ground; bush covers chiefly steep and rocky mountain sides, shingle terraces, and high plains. Pastures, natural or artificial, are not very extensive. Of cultivated plants (mostly introduced), in the Tierra Caliente we have the coconut-palm, cocoa, indigo, tobacco, rice, and one kind of banana. Other bananas, sugar-cane, pine-apple, manioc, cotton, maize, coffee, orange, and cherimolla, reach into the Templada. The best coffee grows between 3300 and 4900 feet. Above 6500 feet on the high plains crops are much as in Central Europe; wheat, barley, maize, and potatoes are grown, the periods of growth being determined by the dry and wet seasons. On the Páramos shrubs of the families *Melastomaceæ*, *Myrtaceæ*, and *Compositæ* are characteristic. Sometimes gay Alpine meadows are seen, and on the higher parts a hard, wiry grass.

The flora is similar, on the whole, to other equatorial and forest-clad parts of South America. In the streams of the lowlands there are the cayman and a great variety of fish; insects, butterflies, ants, &c., abound. Birds are particularly brilliant. Of mammals, those suited to forest life—monkeys with prehensile tails,

the tapir, sloths, armadillos; also the jaguar, puma, and a kind of bear. The two last sometimes roam on the open Páramos. Most of the domestic animals of Europe have been introduced, and cattle and horse live in a half-wild state on the Páramos. The llama is not found on these, as the chain is separated by lowlands from those of Peru.

It is difficult at the present day to discriminate clearly between the various ancient tribes, or to determine the relationship which they bore to other tribes of South America. The terminations of still-used place-names form, however, some guide towards the former. The Chibchas seem to have occupied the greatest area, as they were in other respects the most important. Their *habitat* seems to have included all the interior and more elevated parts of the range. The Spanish immigrants, whose numbers were limited, and who here belonged, as a rule, rather to the upper classes at home, found the need of the natives as workmen; so the latter were not exterminated, but subdued, and mixed much with their conquerors. Since the independence, other Europeans have come in, Italians being in greatest numbers, but Germans and English holding a higher position. Pure wild Indians are rare, but large communities of civilised tribes remain, principally on the high lands. Negroes were brought in as slaves, but all have been free since January 1st, 1852. The proportions of the various races now are: Whites, 10 per cent., mixed race and pure Indians, each 40 to 45 per cent., and negroes and negro half-castes, 5 per cent.

At the time of the conquest the Chibcha country was the chief seat of population, but that conquest much thinned their numbers. In the present century the yearly increase has varied from 9 to 3·1 per cent., the clearing of new ground, as a rule, proceeding but slowly. Population is thickest on the high plains (120 per square mile), where the conditions are the most favourable for work, and which in this respect are distinct from the rest of the Tierra Fria. Next come the more important valleys comprised within the Tierra Templada (e.g., 100 per square mile in the system of the Sogamoso). The forests on the outer slopes contain hardly any inhabitants, and the Páramos only a scattered population of cattle-rearers. Many of the settlements date from Indian times; others were founded as centres of Spanish authority or as missions. The country towns are the most numerous; these form agricultural centres, and their weekly market is an important institution. Some mining towns occur; others owe their prosperity to trade, as Zipaquirá to the salt trade, and La Mesa (half way between the Magdalena and Bogotá) to the interchange of commodities between the high and low lands. Bogotá alone, the capital, and seat of the National University, and an important centre of trade, has a population of over 50,000 inhabitants, most of the other towns coming far behind. It makes a poor impression compared with other capitals, owing to narrow streets, bad lighting, and dirt.

Means of communication are backward. Few rivers of the range are navigable, nor have roads been made except on the high plains. Most of the tracks are merely mule-paths, and date from Indian times, going straight over all obstacles, and disdaining to find an easier route by *détours*. The sudden floods are a hindrance to communication; only in a few cases have stone or even iron bridges been made; whereas those of rope and bamboo are still much in use. Horses and mules are the chief means of transport. Husbandry and cattle-rearing are the principal occupations, and next to them mining. Of the cultivated plants already mentioned, the sugar-cane and coffee are perhaps the most grown. Natural products, the collection of which gives employment, are the better sorts of timber and ivory-nut from the lowlands, and the cinchona bark (and latterly also cuprea bark) from the higher districts; also orchids and other flowers for cultivation. Some native trades

exist, as cotton-weaving, pottery, and straw-hat making; but European industries have been tried with slight success. The trade with West Europe and the United States is more than could have been expected. Some wheat, and almost all manufactured goods, are imported, while the exports are principally emeralds, hides, and coffee (the low price having put a stop to that of cinchona). Prosperity, on the whole, seems rather diminishing than increasing, the distance from the sea, and little intercourse with the rest of the world, being great hindrances to progress.

GEOGRAPHICAL NOTES.

The Monthly 'Proceedings.'—It has been resolved by the Council that with the beginning of 1893 the title of the Society's monthly publication shall be changed from 'Proceedings' to 'The Geographical Journal.' The regulations which in 1879 were laid down by the Council for the conduct of the 'Proceedings' were really applicable to a monthly magazine including not only the Papers read at the Society's meetings, but covering the whole field of Geography. As the Fellows who read their 'Proceedings' are aware, it has been sought, with more or less success, to carry out this programme. For the purpose of being able to carry it out more thoroughly, the Council have resolved to increase the size of the publication to 96 pages. It was felt, therefore, that some title more indicative of its character should be adopted. It is hoped that in its new form the Society's organ will attract more attention, not only from Fellows, but from the general public. Both maps and illustrations will form a more prominent feature than in the past. It is hoped that Fellows will draw the attention of their friends to the new departure. An index to the fourteen volumes of the New Monthly Series (1879-1892) will be prepared and issued as soon as possible.

Christmas Lectures to Young People.—Fellows are reminded that it has been arranged to have two lectures to young people at Christmas. The dates have been changed to Friday, December 30th, 1892, and Friday, January 6th, 1893. The lectures will be by Mr. John Coles, the Society's Map Curator, and will deal with his own experiences and observations in various parts of the world, from Mauritius to Iceland. The lectures will be amply illustrated by means of the lantern. Application should be made for tickets to the Chief Clerk.

Second Columbus Celebration at Huelva.—Our correspondent who provided us with a detailed account of the model frigate *Santa Maria* (p. 700), has forwarded a detailed account of the second Columbus fête at Huelva, which supplements the brief notice on p. 797. Her Majesty's ships *Australia*, *Phaeton*, *Amphion*, and *Scout* took part in the proceedings. The U.S.S. *Bemington* conveyed the two model caravels *Niña* and

Pinta, which had been so faithfully reproduced as to have their seams paid with tar and tallow instead of being caulked in the modern way; and this process did not render them quite watertight under the ordeal of being towed at the rate of 7 or 8 knots. The *Niña* is rigged after the style of the *Santa Maria*, but the *Pinta* has fore and aft balanced sails cut after the lateen shape, only with shorter yards. The nations represented by ships at Cadiz were the British, French, Italian, Russian, German, Portuguese, United States, Mexican, Argentine, Austrian, and Dutch. On Sunday, 9th inst., the Queen Regent arrived by train from Madrid, accompanied by the little King and the two Princesses. A *Te Deum* was performed at the Cathedral, after which a reception was held at the Hotel de Ville, and the foreign officers were presented to the Queen Regent. After the function on shore, the Royal party went on board the despatch vessel *Conde del Venadito*, which had been prepared for their reception, and they made her their headquarters until they left Huelva. On Monday morning the vessels of all nations moved out of the harbour and went through a series of evolutions in concert—an almost unprecedented incident. The vessels were drawn up in a double line, and about 8 A.M. the cruiser *Conde del Venadito*, flying the Royal Standard of Spain, and escorted by four other vessels, passed between the lines, each opposite pair of ships saluting and manning ship as she passed. The Queen Regent was on the bridge, waving her handkerchief to each ship. On her arrival at the end of the lines the combined fleet proceeded to Huelva. When abreast the bar of Saltes the *Conde del Venadito* put herself at the head of the combined fleet, which formed in single line, and the Royal cruiser having passed down the whole length of the line, each ship manning, saluting, and cheering as she passed, the fleet returned to Cadiz, while the Queen crossed the bar and proceeded up the river to Huelva, accompanied by the smaller of the foreign vessels. On Tuesday, 11th inst., all foreign officers wishing to attend the ceremonies at Huelva were taken there in the transatlantic ship *Joachim Pielago*. Arriving in the evening, the Minister of Marine came on board, and on the part of Her Majesty presented decorations to the senior foreign officers. All the officers were lodged in a large steamer moored in the river, there being no room to be had ashore; but the entertainment was most sumptuous, and the gathering of officers of all ranks and nations was most harmonious. In the afternoon there was a procession illustrating the industries of Huelva, and at night a grand ball at the Hotel Colon, preceded by a reception to the foreign officers by the Queen, who spoke to almost every officer, and to most of them in their own language. The 12th, being the day on which land was first sighted by Columbus, was the principal day of the fête. Mass was celebrated at the convent of Santa Maria del Rabida. The Queen went down the Odiel River to the pier built for the occasion, opposite the

convent, and was driven up the hill in a carriage drawn by four mules; the road was lined with soldiers, and bands were stationed both at the landing-place and also at the convent. After a short service in the chapel of the convent, the Royal party moved on to a dais erected opposite to the monument which has been built to commemorate the occasion, and after several speeches from deputies, and one from the Archbishop, the monument was sprinkled with holy water; prayers were said by the officiating priests, and the ceremony was complete. The Columbus Monument is high, and being situated on the summit of a hill, it forms a valuable landmark for ships making the bar of Huelva, specially so as the coast is very uniform in this neighbourhood, and there are but few well-defined landmarks for bearings.

The Late Dr. Arthur Breusing.—Arthur Breusing was born on March 18th, 1818, at Osnabrück, and studied in the universities of Bonn, Berlin, and Göttingen. He devoted himself mainly to the study of the principles of navigation, both mathematically and practically at sea, and was for many years Director of the School of Navigation at Bremen. He was the author of many popular works on seamanship, and contributed to the Berlin Geographical Society a series of papers on the history of geography, dealing mainly with the invention of the compass, and the work of the earlier cartographers. His largest historical work, '*Die Nautik der Alten*,' was published at Bremen in 1886. Dr. Breusing died on September 28th, 1892.

Magnetic Conditions in Central Asia.—At a recent meeting of the Académie des Sciences, M. A. de Tillo contributed a note on a comparison of Pevtsoff's magnetic observations in Central Asia, with the data given in Captain Creak's report on the magnetic results of the *Challenger* expedition. After correcting the latter for the secular variation, the amount of the correction being, however, not very exactly known, it appeared that Creak's data for Central Asia gave from 1.5° to 2° too little eastern declination, but the figures for dip were only from one-tenth to one-half a degree in error.

Indian Marine Survey, 1891-92.—The administration report of the Marine Survey of India for 1891-92 shows that between March 9th, 1891 (up to which date the last report reviewed the operations), and April 17th, H.M.S. *Investigator* carried the survey of the eastern coast of Hindustan as far south as the central mouth of the Godavari River, in $16^{\circ} 25'$ N. lat. The vessel then returned to Bombay, the officers repairing to Poona, where the following charts were drawn, viz., Cocos Islands, Marshall Channel, Pentakota to Bimlipatam, Sacramento Shoal to Pentakota, Cocanada Anchorage, central mouth of Godavari River, Veraval Roads and Harbour, Jafarnad Harbour, Murex Bluff to Stial Pot, and the approaches to the Shat-el-arab and the Bahmtshir River, at the head of the Persian Gulf. For the season 1891-92 it was arranged that

a resurvey of the Lakadive Islands should be undertaken, as well as a resurvey of Deogarh Harbour and part of Bombay Harbour, and the continuation of the survey of the east coast of Hindustan. Lines of soundings were run across the banks to the north of the Lakadive Islands, and the positions of the Cherbaniani and Byramgore Reefs were determined by observations of stars, and sketch-surveys made. After a visit to Calicut, the *Investigator* returned to the Lakadives. The positions of Kiltan, Cardamum, Betra-Par, and Kalputi Islands, and of Pare-mul-par and Piti Reefs, were determined, and sketch-surveys made of Aukutta and Kalputi Islands, the ship returning to Calicut on November 23rd. During the ensuing weeks a plan of Minikoi was made and its position fixed, and on December 20th a search was made for the "City of Venice" rock, reported in May, 1891, to exist off Mirissi Point, South Ceylon; but no trace of a rock or shoal-water was found in the position assigned. The vessel then repaired to Cocanada, and on January 25th work was commenced at the central mouth of the Godavari, and pursued without intermission up to the date of the report, i.e., March 16th last, at which date the coast-survey had been completed to near False Point, Divi, or lat. $15^{\circ} 43' N.$, long. $80^{\circ} 53' E.$ The boat party carried out a survey of Deogarh, in the Ratnagiri District, on the scale of 6 inches to the mile. The death of the officer in charge of the surveys, Commander R. F. Hoskyn, R.N. (already noticed in our 'Proceedings' for March last), occurred on January 27th last, to the deep regret of his fellow officers. During the period under review further investigations were made into the littoral zoology of both the Malabar and Coromandel coasts, and of the Lakadive Islands, and into the deep deposits and deep life of the surrounding seas; and Surgeon A. Alcock's report forms probably the most interesting scientific paper hitherto submitted in connection with the Indian coast survey operations.

The Nomenclature of the Karakoram Peaks.—The following letter has been received by the Secretary from Mr. Conway; it is dated Abbottabad, November 2nd, 1892:—"After we left Askoley for the Baltoro Glacier, Mr. Eckenstein, who remained behind, found a man who drew for him on the sand a rough map of that glacier and its surrounding mountains. He put in both the Mustagh Passes, the Mustagh Peak, K 2, Gusherbrum, and Masherbrum, all in their right places. He stated that Skinmang is the local name for the great Mustagh Peak, and Chiring the name for K 2. I have recently noticed that though the great Mustagh Peak is scarcely, if at all, indicated on the Government map, it is quite clearly marked on the map that illustrated Colonel Godwin-Austen's paper in the 'Proceedings' of the Royal Geographical Society."

Russian Colonisation in Turkestan.—The 'Turkestan Gazette' gives the Russian agricultural population in the three districts, Tashkent, Charkent, and Aulie-ata of the Lyr-dariinak Province at 2815 families, or 16,000 persons, settled in 47 villages, chiefly along the Tashkent high road. Fourteen schools, having regularly-authorised teachers, have been opened; also 8 medical stations and dispensaries regularly visited by doctors. The population is described as wealthy. One of the last administrative measures was the distribution of 1500 rifles, with provisions of cartridges, to the peasant population.

The Trans-Caspian Territory.—The Russian 'Official Messenger' gives the population of this territory in 1890 as 254,823, of whom 62,950 *kibitkas* (235,596 souls) are Turkomans, Kirghiz, and Persians, and 9227 strangers, of whom 5000 are Russians. This last figure has, however, considerably increased during the year 1890, especially at Askabad and Hormab. New Russian settlements have also grown up at Kozelnoye, Nikolayevskaya Stanitsa, Fort Alexandrovsk, and on the islands Bolshoi and Mirnyi-Dolghiz. The increase of the settled Turkoman population in the upper parts of both the Persian Rivers Tejen, Chandyr, and Sumbar, and the Afghanistan Rivers Kushka and Murghab, and the consequent increase of irrigation, result in an increased demand for water, and measures are taken to clean and improve the canals of old. The demand for water is especially great at Askabad, which is now the centre for administration of the railway (formerly at Charjui); consequently modifications of the existing irrigation canals have been made, and an additional 465,000 gallons of water a day have been obtained. Moreover, an artesian well, which will have a depth of about 1750 feet, is projected, and the necessary geological surveys are completed. Measures have been also taken to prevent a wanton destruction of the trees in the mountains, and 27 acres of land at Koshi, above Askabad, are to be planted with trees (36,000 trees already planted). Cattle-breeding is the chief source of wealth in the territory, and on January 1st, 1891, the number of cattle was estimated at 1,750,000 sheep and 91,500 camels.

Exploration in Sikhota-alin.—The highlands between the Ussuri and the Pacific Coast have been hitherto one of the least explored parts of the Russian dominions in Northern Asia. This year a geological expedition, under Colonel Ivanoff, explored the neighbourhood of St. Olga Bay, namely, the valleys of Le-fudin and Vai-fudin; the silver mines situated 100 miles north of the bay, which are worked out by Chinese; the "White Mountain," which proved to contain magnetic iron. The expedition then left the St. Olga Bay in order to explore the coast mountains towards Vladivostok, which are said to be rich in lead, silver, gypsum, coal, and perhaps also in gold. Surveys and barometrical measurements of altitudes were made all along the explored line.

Dr. O. Baumann's Journey into the Countries to the South-East of the Victoria Nyanza, May to July, 1892.*—Dr. O. Baumann has, according to the 'Deutsche Kolonialzeitung,' succeeded in exploring a considerable tract of country lying to the south-east of the Victoria Nyanza. Starting from his station in Kadoto (at the mouth of the Ruwana) on May 6th of the present year, he followed the northern shore of

* Dr. Baumann's route is roughly indicated on the map accompanying Captain Lugard's paper.

Speke Gulf, and waded through the Rugeshe Canal to the island of Ukerowe. After a visit to Ukara, which he found inhabited by an industrious agricultural people, and not by dwarfs, as reported, he crossed over to the mainland, effecting a landing immediately to the south of Majita, then discovered that the bay immediately to the south of that mountain extended far into the interior, like a fiord, its surface dotted over with numerous lofty islands of great fertility. Following the sinuosities of this gulf during five days, Dr. Baumann crossed a narrow neck of land, and once more found himself on the shore of the great lake, having the Kurazu Islands in front of him. The coast there was crowded with villages of Wakwaya and Waruri, who have fine fields, and grow much tobacco. He then crossed the district of Mugango, inhabited by Waruri and Wagaya (Kavirondo), where, unfortunately, he came into collision with the natives. Leaving the lake shore, he turned inland, reaching, after a six days' march, the district of Ngoroine, on the Ngare Dabash, known in its lower course as Mara, or Maroa. The whole of this region is hilly, abounds in perennial streams, and is of great fertility. Steep granite rocks rise from the ridges of the hills, and among them may be seen the numerous huts of the Washashi, a friendly people, who go nearly naked, paint their bodies red, and feed on millet and ground-nuts. Having reached Kwa Hindi, the furthest village of Ngoroine, towards the Masai (June 4th), Dr. Baumann turned to the south. He passed through Nata, a large village, near which are the sources of the Ruwewa, crossed his old route, and still travelling in a southerly or south-westerly direction, he arrived in the district of Meatu, where he took up his residence with Nwini Hemedi, the leader of a party of Swahili ivory hunters. From here he made an excursion to the salt marshes at the southern end of the lake discovered by him, and crossed the Simbiti, or Lower Wembere, which feeds it. Finally, Dr. Baumann proceeded from Nwini Hemedi's to Mwanza, the German station at the entrance of Smith Sound, where he arrived on July 20th.

Monteil's Journey from the Niger to Tripoli.—According to a telegram from Tripoli, Captain Monteil has succeeded in his attempt to reach Lake Chad and cross the Sahara. Leaving Kano (see p. 470) on February 19th, he reached Kuka on April 10th, and met with an excellent reception. Here he remained for several months, and on August 15th left with a guide, who was instructed by the sheikh to see him as far as Murzuk. Kavar was reached on September 12th, and left on September 29th for Tejerri, where Monteil arrived on October 17th, and was preparing to proceed to Tripoli when he wrote the despatch sent on in advance. The journey was uneventful save for the loss of many camels in the Sahara. No hostilities were met with. The journey, although now made for the first time by a Frenchman, does not appear to have opened any new ground. The route between Kuka and

Tripoli seems to have been the ordinary caravan road regularly used by the Arab traders. Denham and Clapperton traversed it in 1824, Barth in 1855, and Rohlfs went over nearly the same district in 1866.

Anglo-Portuguese Boundary Commission, South-East Africa.—The English officers attached to this Commission reached Beira on April 22nd last, and after a few days' detention proceeded up the Pungwe River in boats as far as Mapanda's, and marched thence to Massi-Kessi, passing over the route travelled by Mr. Bent last year, but in the contrary direction. Owing to the quantity of baggage and stores to be transported, the progress was slow, and Massi-Kessi was not reached until the end of May. Since that time, the party under command of Major Leverson, R.E., has been employed in making a survey of the boundary. Geographically speaking, the most important points that have been discovered (provisionally) are, that Massi-Kessi is shown from 15 to 20 miles too far west on most English maps, and that the remarkable bend of the Umswili River, shown in dotted lines on the Intelligence Branch map, is very nearly correct. At the end of August the party was surveying between Massi-Kessi and the Limpopo River, and was on the point of entering a district about which very little is known, and which is shown almost as a blank on the map. Up to this point the country traversed had been very mountainous, well watered, and in most places fertile. Many of the villages are spoken of as being lovely, with beautiful clean streams and luxuriant tropical vegetation. Where there was no forest the surface, even up to the summits of the mountains, is generally covered with tall thick grass from 6 to 12 feet high. In July, at altitudes varying from 2300 to 3000 feet, the thermometer commonly fell to 34° Fahr, and sometimes to freezing point, just before sunrise. All survey operations for the year were brought to a close during November.

Captain Bia's Katanga Expedition.—The 'Mouvement Géographique' publishes a report and map of the third Katanga expedition. It started under the command of Captain Bia from Lusamba, on the Sankuru, which was reached by steamer from Stanley Pool. The Le Marinel expedition, starting from the same point, followed up the Lubi River; that of Captain Bia took a nearly parallel course up the Lubilash River, the upper waters of the Sankuru, whence they started on November 11th, 1891. Beyond the rapids, where the name Lubilash is first given to the stream, as far as the junction of the Luembo, in 6° 20' S., the country was traversed for the first time, the journey occupying fifteen days. The river flows in a plain with many windings, and the banks are wooded, but at a little distance they rise into hills cut by deep ravines. At the first rapids the elevation was 1800 feet, at the Luembo 2400. Farther on the land becomes flat and grassy, with no trees. The natives were peaceful and friendly. The right

bank of the Luembe was followed for twelve days, the banks being low, wooded, and abounding with game. The villages along the river had been devastated by slave-raiders. Where the expedition left the Luembe the elevation was 3400 feet, and the route continued eastward over the plateau about 50 miles north of Le Marinel's return journey, and nearly parallel to it to Bunkeia, in the heart of the Garenganze country.

Proposed Change of the Capital of Brazil.—The '*Revue Française*' states that, in accordance with the new constitution of the Brazilian Republic, the capital is to be removed from Rio de Janeiro to a Federal district, which is to be marked off in the healthiest part of Brazil. A scientific commission, under M. Cruls, has been appointed to search for a suitable site. The headquarters of the expedition will be on the central plateau at an elevation of about 3500 feet, near lat. 20° S. This plateau in the province of Minas Geraes forms the watershed between the great rivers Parana, Tocantins, and Sao Francisco.

A Rainy Period in Southern Peru.—Mr. A. E. Douglass, of the observatory which is maintained by Harvard College at Arequipa, gives, in '*Science*' of October 21st, a summary of the evidence pointing to the former existence of a rainy period in Peru. The most striking indication was found in the remains of an enormous glacial system on the slopes of Charabani, where neither ice nor snow is now found. Vast moraine deposits on the upper slopes are bordered below by valleys filled with water-worn pebbles and boulders, signs of former rivers of considerable size and volume. Reasons are assigned for believing that the climate during the glacial period in Peru was no colder than at present, meteorological observations showing that the one condition necessary for producing glaciers now is heavy precipitation. The rapid elevation of the ridge of the Andes in recent geological times is held to be the cause of the reduced rainfall.

Patagonian Exploration.—'*Globus*' prints a short account of Dr. Machon's exploring journey, in the spring and summer of 1892, through the Rio Negro, Neuquen, and Chubut territories. He started from Bahia Blanco, and travelled up the Rio Negro valley to Fuerta Roca, thence up the Limay and Collon Cura, across the volcanic district of Neuquen, at the base of the Cordillera. Here apple-trees were found flourishing, the only relics of a once prosperous Jesuit mission-station. Striking southward, Lake Nahuel Huapi was explored, and found to be studded with little wooded islands, although the air temperature at the time was only 6° F. Near this lake an English company has a large ranch. Travelling southward, and crossing some passes of 4500 feet, where herds of guanacos were found in the snow, the party at length struck the upper valley of the Chubut, and followed that river

to the Atlantic. Valuable anthropological observations and collections were made, and Mr. Santiago Roth, who accompanied the expedition, added considerably to the knowledge of the geology of this part of the Andes.

Melville Island, Northern Australia.—Mr. M. Holtze, in a paper read before the Royal Society of South Australia, describes an exploring tour across Melville Island, off the north coast of South Australia, performed in October, 1887. The expedition was organised by the Government Resident, with the view of exploring the interior of the island, which, owing to the warlike and uncompromising attitude of its natives, is still very little known. The island was crossed from a point a few miles to the east of Cape Gambier, on the southern coast, to Lethbridge Bay, on the north. The summit of the coast hills, about 200 feet above the level of the sea, is stated to be composed of ironstone conglomerate, sparsely timbered with *Eucalyptus*, *Grevillea*, *Acacia*, and interspersed with *Bombax*, *Erythrophloeum*, and *Metrosideros*. Farther on the land rises gradually, and is intersected by low ironstone ridges. Between this point and Lethbridge Bay the country consists mainly of open forest, with here and there a creek, and ridges covered with ironstone boulders, with swamps near the sea. Between Brenton Bay and Lethbridge Bay a large inlet of the sea, not marked on the map, was discovered, and named "Robinson's Inlet." Throughout the journey the party appear to have suffered little from want of water; but the few natives encountered were most warlike. The most prominent feature botanically observed on Melville Island was the fact that no bamboos were met with. A botanical novelty was found in the shape of a *Licistona humilis* with four distinct branches. No orchids whatever were observed, and with the exception of the *Lycopodium ceratium*, no plant which Mr. Holtze had not previously collected on the mainland.

Easter Island Inscriptions.—The second number of the 'Journal' of the Polynesian Society contains a paper by Dr. A. Carroll, describing his researches into the language of the Easter Island inscriptions, and his decipherment of the characters employed. He considers that Easter Island was early colonised by emigrants from Western America, who were in possession of a written or hieroglyphic language, the use of which was ultimately prohibited in America by the Incas. A grammar and lexicon of the language of the inscriptions is promised, together with the more important renderings. The present number merely gives two prayers to the sun.

Antarctic Whaling Expedition.—The four vessels *Balena*, *Activa*, *Diana*, and *Polar Star* (see p. 637) left Dundee for the Antarctic whaling ground on September 6th, 7th, and 8th. One of the vessels had to put into Queenstown for repairs, and another was obliged to call at Madeira

for coal, as they experienced very rough weather on setting out, and had to use steam for several weeks. The other ships escaped the worst of the storm, and are now believed to be at work on the margin of the Antarctic ice. The *Balarna*, from which the most valuable scientific results are expected, has on board an artist, Mr. W. G. Burn-Murdoch, who hopes to succeed in obtaining some characteristic paintings of Antarctic icebergs.

Further Explorations in British New Guinea, by Sir William Macgregor.—Recent despatches from the Administrator of British New Guinea report further tours of inspection by him in the eastern end of the island. They include a visit to Libikina, the principal village of the Soroaki tribe, which is built on a ridge about 150 feet high, and situated about a quarter of a mile from the Vanigira River (Kemp-Welch). Imoagola, the principal village of the Wabba-rabba tribe, was also visited. The country between that and Soroaki, about 10 miles in distance, consists of low grassy limestone hills, and is described as being fit for pastoral purposes, with patches of good soil in the little valleys. Imoagola is built on the top of a little hill about 200 feet high. During this tour an inspection was made of the coast of the Aroma district, from Parraman, the most westerly, to Billerufu, the most easterly, of the Aroma villages. Various islands in the eastern end of the Possession have also been recently visited by Sir William Macgregor, notably that of Yela (Rossel Island). The coast-line of the latter was examined as far as the island of Dyama, identified as the "Cape Deliverance" of D'Entrecasteaux. The island of Dyama contains some four or five acres, and is uninhabited. The whole of the south side of the island of Yela is described as mountainous, and covered by dense forest. The shore reef extends all the way from the entrance to Rossel Lagoon to Loa (Adele Island), at a distance of half a mile to a mile from the beach. An examination was also made round the north coast of the island as far as Jenggi Point. The Yela tribes, in Sir William's opinion, belong to the Papuan race; indeed, he infers that they are the purest-blooded Papuans in British New Guinea. The language of the islanders is of great interest, on account of the all but complete isolation of the island. So far as can be judged from the materials collected, the language differs greatly from those of Kiriwina, Murnu, and even from Togula, the nearest island. Speaking of the trade of Yela, Sir William says:—"The extent of reef round about the island is so great that it will always yield each year a certain quantity of trepang. Its forests produce more gum than any others of equal area. Other articles of export, as sponges, shell, cane, will produce a small trade. That the natives will readily enter into this there can be no doubt."

REPORT OF THE EVENING MEETINGS, SESSION 1892-3

Special Meeting, November 3rd, 1892.—The Right Hon. Sir MOUNTSTUART E. GRANT DUFF, O.C.S.I., President, in the Chair.

The paper read was:—

"Journey from the East Coast to Uganda, and the Great Equatorial Lakes of Africa." By Captain F. D. Lugard.

The paper is published in the present number of the 'Proceedings.'

First Ordinary Meeting, November 14th, 1892.—The Right Hon. Sir MOUNTSTUART E. GRANT DUFF, O.C.S.I., President, in the Chair.

The PRESIDENT made the following remarks before the ordinary business of the meeting began:—

Matters relating to the Rules and management of the Society can only be discussed at meetings specially summoned for that purpose. My duty to-night is limited to informing the Fellows present that a Special General Meeting will be held on this day fortnight, in this Hall, at 4.30 p.m., for the purpose of bringing our Rules up to date, and revising them in accordance with resolutions of the Council proposing the establishment of a scale of reduced commutation fees for Fellows of long standing, raising slightly the present entrance fees, and better regulating our meetings.

Owing to the number of Fellows of the Royal Geographical Society who were unable to hear Captain Lugard's paper on Uganda, on the 3rd instant, Captain Lugard has undertaken to read his paper again on Thursday, the 24th instant. Ordinary Fellows' tickets will not be available. Admission will be by tickets, to be applied for by Fellows at 1, Savile Row, W. A certain number of places will be reserved up to 8.15 for Fellows applying before Saturday next, and specifying in their application that they were unable to be present at the previous lecture. Each Fellow will, as far as the number of applications admit, be allowed to introduce one friend.

ELECTIONS.—*Reginald Barratt, Esq.; Charles James Boustead, Esq.; Henry David Boyle, Esq.; Captain Reginald S. Curtis, R.E.; Captain Harry Gordon Dunning, Royal Fusiliers.*

The paper read was:—

"How Can the North Polar Region be Crossed?" By Dr. Fridtjof Nansen.

The paper will be published, with map and illustrations, in the January number.

Maps and photographs were exhibited in the tea-room.

NEW GEOGRAPHICAL PUBLICATIONS.

(By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.)

EUROPE.

Backlund, O.—Anteckningar från tvenne resor i norra Ryssland. Fennia 5 for 1892: pp. 34. Maps.

Two journeys in northern Russia, undertaken in 1889 and 1890, for the astronomical determination of positions in the region bordering the Arctic sea west of the Pechora.

Bladé, J. F.—Géographie politique du sud-ouest de la Gaule franque, d'après le cosmographe anonyme de Ravenne. *Revue de Géographie*, XVII. (1892): 100-106, 175-182, 339-344.

A contribution to the early historical geography of France.

Corti, Siro.—Le Provincie d'Italia sotto l'aspetto Geografico e Storico. Rome, Paravia e Comp., 1892: 12mo, parts 52, 53, 55, 56. Price 50 centesimi each part. Maps and illustrations.

The four new parts of this prettily illustrated series deal with the provinces of Belluno, Padua, Treviso, and Udine, in the Venetian region.

Duffy, Bella.—The Tuscan Republics (Florence, Siena, Pisa, and Lucca), with Genoa. London, T. Fisher Unwin, 1892: 8vo, pp. xix., 456. Map and illustrations. [Presented by the Publisher.]

The thirty-second volume of "The Story of the Nations" Series is devoted to the rise, prosperity, and decline of the mediæval republics of Northern Italy. While truly a piece of history, such a book has necessarily considerable geographical interest. The causes of many of the changes referred to were purely geographical. Commercial prosperity passed like a wave from east to west along the Mediterranean basin, following the expansion of geographical discovery; and the period of republican greatness in Tuscany, Genoa, and Venice coincided with the passing of the crest of this wave. The authoress may not fully have realised this aspect of the subject; but in so far as she has done so her history has quickened in interest.

Filippo, P. Amat di S.—I veri scopritori delle Isole Azore. *Bollettino della Società Geografica Italiana* [3] v. (1892): 529-540.

A critical note on early cartographical representations of the Azores.

[**Finland.**]—Wissenschaftliche Ergebnisse der Finnischen Expeditionen nach der Halbinsel Kola in den Jahren 1887-1892. A: Kartographie, Geologie, Klimatologie. B: Botanik-Zoologie. Helsingfors, 1892: 8vo, separately paged. [Presented by Professor J. A. Palmén.]

This is a reprint of the various contributions to 'Fennia,' descriptive of the recent Kola expeditions, and of the scientific observations and collections which were made during them.

Guy [Prof.], Camille.—L'Île d'Yeu. *Annales de Géographie*, I. (1892): 390-403.

The Île d'Yeu, shown on many maps as Île Dieu, lies off the coast of La Vendée, and presents several peculiarities, which are here described.

Joanne, P.—Collection des Guides-Joanne. Itinéraire Général de la France. Auvergne et Centre. Paris, Hachette & Co., 1892: 12mo, pp. xxiv. and 374.

Illustrated with 7 maps and 10 plans.

No. XII.—DECEMBER 1892.]

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Krause [Dr.], Ernst H. L.—Florenkarte von Norddeutschland für das 12. 15. Jahrhundert. *Petermann's Mittheilungen*, XXXVIII. (1892): 231-235.

A curious map of the vegetation of North Germany in the Middle Ages, constructed from old documents.

Kreus, Franz.—Sumpf- und Seebildungen in Griechenland mit besonderer Berücksichtigung der Karsterscheinungen und insbesondere der Katabothren-Seen. *Two maps.* *Mitt. der k.k. Geograph. Gesell. in Wien*, XXXV. (1892): 373-417.

An admirable account of the underground watercourses connected with the katabothren and marshy lakes of Greece, including the history of speculation and exploration, and the projects for ultimately improving the climatic conditions by reclaiming land.

Lestrade, P. *Géographie du Département de la Corrèze.* *Bulletin Soc. Géog. Com. de Bordeaux*, 1892: 465-488.

Sketch of the geography of Corrèze in Limousin.

[Murray's Handbooks.]—Handbook for Travellers in Derbyshire, Nottinghamshire, Leicestershire, and Staffordshire. Third edition. With maps and plans. London, John Murray, 1892: post 8vo, pp. x. [3s.] and 229. Price 9s.

[—].—Handbook for Travellers in Kent. Fifth edition. With maps and plans. London, John Murray, 1892: post 8vo, pp. [22] and 296. Price 7s. 6d.

The present editions of the above handbooks have been carefully revised and brought up to date. The numerous large-scale maps, by Messrs. Bartholomew, with which the present editions are furnished, form a special feature, and very materially add to the usefulness of the books.

Our Western Hills: How to Reach Them; and the Views from Their Summits. By a Glasgow Pedestrian. Glasgow, Morison Bros., 1892: 12mo, pp. 154. Price 1s. [Presented by the Publishers.]

A readable guide to some of the highest of the western hills of Scotland.

Paloczky [Prof.], L.—Lyon. Ein französische Stadtebild. *Deutsche Rundschau für Geographie*, XIV. (1892): 403-414, 490-501.

A study of the city of Lyons in all its relations.

Penck, Albrecht.—Vom Dachsteinplateau. *Ausland*, LXV. (1892): 607-669.

Petreljus, Alfred.—Ueber die kartographischen Arbeiten der Expedition vom J. 1891 nach der Halbinsel Kola. *Fennia* 5 for 1892: 14 pp., with map.

A description in German of the results of an exploring expedition in the Kola Peninsula in 1891. The same number of 'Fennia' contains a paper in Finnish, by K. Grotenfelt, on "Two Early Maps of the Kola Peninsula."

Pouchet [Prof.], Georges.—En Islande. *Bulletin Société de Géographie Commerciale du Havre*, 1892: 129-167.

Account of a summer residence in the extreme north-west of Iceland.

Ramsay, Wilhelm.—Kurzer Bericht über eine Expedition nach der Tundra Laptek auf der Halbinsel Kola. *Fennia* 5 for 1892: pp. 32. Diagrams.

Richter, Eduard.—Urkunden über die Ausbrüche des Vernagt und Gurgler Gletschers im 17ten und 18ten Jahrhundert. Stuttgart, J. Engelhorn, 1892. 8vo, pp. 40. Maps. Price 7s.

This is the last part of the sixth volume of the 'Forschungen zur Deutschen Landes- und Volaskunde,' edited by Professor Kirchhoff, and is a collection of documents relating to floods caused by the above glaciers at various periods.

during the seventeenth and eighteenth centuries. The dates are 1600-1601, 1678-1681, 1716-1724, 1770-1774. In an appendix Professor Richter criticises the measures usually adopted for the protection of property against glacier disasters, and advocates a systematic and thorough regulation of the river-bed as a more effective remedy than canals and other works in the immediate vicinity of the glacier. The two maps based on the original surveys (scale 1 : 25,000) of the Austrian staff, and executed by Wagner and Debes, of Leipzig, are excellent.

Sauer, A.—Die alte Neckarbetten in der Rheinebene. Globus, LXII. (1892): 193-195.

This contains an interesting map of the former windings of the Neckar over the Rhine valley.

Seeborg, P.—Kultur- und Wirtschaftsbilder aus dem Nördlichen Russland. Das Ausland, LXV. (1892): 300-303, 314-317, 331-334, 347-349.

On the economic conditions of Northern Russia.

[**Switzerland.**—Annuaire de la Suisse Pittoresque et Hygiénique. Stations de Cures d'Air, Bains, Belles Excursions, Villes d'Hiver de la Méditerranée. Quatrième édition, 1892-1893. Lausanne, Bureau de la Bibliothèque Universelle; Paris, Firmin-Didot & Co.: 12mo, pp. 532, maps and illustrations.

[—].—Statistisches Jahrbuch der Schweiz. Herausgegeben vom Statistischen Bureau des eidg. Departements des Innern. Zweiter Jahrgang, 1892. Annuaire Statistique de la Suisse publiée par le Bureau de Statistique du Département Fédéral de l'Intérieur. Deuxième Année, 1892. Bern, 1892: large 8vo, pp. xvi. and 364, map.

Statistics of Switzerland.

Thornton, B.—The Comparative Climatology of London and the chief English Health Resorts. London, H. K. Lewis, 1891: 12mo, pp. 15, map. [Presented by the Author.]

Reprinted from the 'Lancet' of September 20th, 1890.

Thoroddsen, Th.—Postglaciale Marine Aflejninger, Kystterrasser og Strandlinjer i Island. Geografisk Tidsskrift, II. (1891-92): 209-225.

An important paper on the recent geological changes of the coast of Iceland, with a map of the island showing the raised beaches, the former limits of the sea on the low coasts, and the area of post-glacial emergence in different places.

—Zwei Reisen im Innere von Island. Petermann's Mittheilungen, XXXVIII. (1892): 25-31, 189-196.

Two summer journeys into the interior of Iceland.

Witkovsky, B.—Détermination à l'aide du télégraphe des longitudes des principaux points du littoral du Golfe de Bothnie. Fennia 5 for 1892: pp. 8.

Telegraphic determinations of longitude for Abo, Björneborg, Wasa, Gamle-Karleby, and Uleaborg, with reference to Pulkova.

ASIA.

Aitoff, D.—Région du Khingan et de l'In-Chan. Nouvelles Géographiques (1892): No. 9, 130-132.

Resumé of the journey of Colonel Putiata and Lieutenant Borodofsky in North China during 1891.

Bishop [Mrs.]—A Journey through Lesser Tibet. *Scottish Geographical Magazine*, VIII. (1892): 513-528.

Leaving Sonnamarg, in Kashmir, in June, 1889, Mrs. Bishop proceeded to Leh, crossed the Digar Pass at an elevation of 17,930 feet, spent some weeks in traversing Nubra, returned to Leh by the Khardong Glacier, and thence by slow marches through Lahul to Simla.

Capus [Dr.], Guillaume.—A Travers le Royaume de Tamerlan (Asie Centrale). Paris, Hennyée, 1892: 8vo, pp. xvi. and 434. Maps and illustrations. Price 10s.

The journey was made in 1880-82 with Bonvalot, and the author now apologises in his preface for his youthful enthusiasm in observing and noting every new fact as he travelled through Western Siberia, Turkestan, Bokhara, Khiva, and across the desert of Ust-Urt. While there could not be much of the nature of geographical discovery about a journey in such comparatively well-known regions, the fresh impressions made on a well-trained and observant naturalist are of value. The route led from Nizhni Novgorod, through Ekaterinburg, Omsk, Semipalatinsk, over the Ala-tau to Tashkent, and Samarkand, reaching the Oxus at Kelif, through Shinbad to Surkhan, back to the Oxus at Termez, returning by another route to Samarkand, and through the Kokistan mountains, visiting the lake of Iskander-kul. The return journey from Tashkent was through the province of Aral-darya, passing Bokhara, Karakul, Charjul, Khiva, and across the Ust-Urt desert to the Caspian. The journey is interesting as describing the condition of Russian Central Asia before the opening of the Trans-Caspian railway.

Chailley-Bert. J.—La Colonisation de l'Indo-Chine; l'Expérience Anglaise. Paris, Guillaumin et Cie., 1892: 8vo, pp. xvi. and 398. Maps. Price 4s.

M. Chailley-Bert has made an honest and open-minded effort to lay before his countrymen the methods of British colonial procedure in Asia, in the hope of obtaining guidance and warning for the administration of the French possessions in Indo-China. More than a third of the book is concerned with Hong Kong, that colony being described in minute and appreciative detail. The remainder deals in a more general but still thorough manner with Burma. The lessons he draws for the successful management of Tonkin are (1), to study the people and get to know their peculiarities; (2) to frame laws in harmony with native custom, flexible enough to be modified for each tribe, and not to attempt to impose a rigorous code; (3) to administer the laws by functionaries selected by competitive examination; (4) to insure security by a well-organised native army; and (5) to educate, equip, and enrich the people by establishing schools, supplying means of instruction and communication, and encouraging them in commerce.

Cousens, H.—An Account of the Caves at Nadsur and Karsamla (Archæological Survey of Western India, No. 12). Bombay, 1891: 4to, pp. 11, plans and plates.

These caves are situated in the Western Ghâts, within 50 miles of Bombay.

Croizier [Marquis], de.—Le Bazar de Bokhara: Souvenirs de Voyage au Turkestan. *Bulletin Soc. Géog. de Marseille*, XVI. (1892): 327-334.

Detailed account of the market-places of Bokhara, and the goods dealt in.

Dauvergne, Henri.—Exploration dans l'Asie Centrale. *Bulletin de la Société de Géographie*, Paris [7], xiii. (1892): 5-40.

A journey in the Kwen-lun Mountains and to the Upper Oxus in 1889, with a map of the route.

Dupont, Martin.—De l'organisation politique et sociale du peuple Annamite. *Bulletin Soc. de Géog. Comm. de Havre*, 1892: 94-114.

A clear account of the political and social arrangements in Annam, by a former French Resident.

Erkert, E. von.—Der frühere Lauf des Amu darja. Das Ausland, LXV. (1892): 545-551.

Discussion of the former course of the Oxus, based on the recent researches of A. Kenschin.

Ermeling [Dr.]—Ein Ausflug nach dem Sinai. Globus, LXII. (1892): 118-124.

Finely-illustrated notes of a visit to the Sinaitic Peninsula.

Grimm [Dr.], H.—Beitrag zur Kenntnis der Koropokguru auf Yezo und Bemerkungen über die Shikotan-Aino. Mittheilungen der Deutsch-Gesellschaft in Tokio, V. (1892): 360-373.

An illustrated description of the underground dwellings of Yezo, and of their inhabitants.

Hahn, C.—Die Vorstellung der Swaneten von dem Leben nach dem Tode. Das Ausland, LXV. (1892), 571-573.

A short study of the Swanetes people of the Caucasus.

Hay, J. O.—Arakan, Past, Present, Future. A *Résumé* of Two Campaigns for its Development. Edinburgh and London, W. Blackwood and Sons, 1892: 8vo, pp. viii. and 216, map. Price 4s. 6d. [Presented by the Publishers.]

Consists of a collection of newspaper articles, letters, etc., dealing with the subject of railway communications in Burma.

Houghton, Bernard.—Essay on the Language of the Southern Chins, and its Affinities. Rangoon, 1892: 8vo, pp. 131. [Presented by the Secretary of State for India.]

This work contains new information regarding the vocabularies and grammar of the Chin tribes.

Kay, H. C.—Yaman; its Early Medieval History. By Najm Ad-Din Omarah al Hakani. London, Edward Arnold, 1892: 8vo, pp. xxv., 358, and 154 of Arabic text. Map. Price 17s. 6d. net. [Presented by the Author.]

Mr. Kay has ably edited a very interesting chapter in Arabian history, and incidentally found it necessary to go pretty deeply into the medieval geography of the province of Yeman. The identification of sites was difficult on account of the vagueness of the Arabian writers, and also because of the changes which have taken place on the margin of the sea, the coast-lands having extended far to seaward, making many former seaports inland places. A map with the existing coast-lines gives a clear idea of Mr. Kay's identification of the old surface features.

Macnabb, D. J. C.—Handbook of the Haka or Baungshe Dialect of the Chin Language. Rangoon, 1891: 8vo, pp. 52. [Presented by the Secretary of State for India.]

[Malay Peninsula.]—Précis of Information concerning the Straits Settlements and the Native States of the Malay Peninsula. Prepared in the Intelligence Division, War Office, from information obtained from official and other sources. London, Harrison and Sons, 1891: 8vo, pp. 178. With maps.

Brought down to date by Captain Foster, R.E.

[Mauritius.]—Mauritius as it was before the Cyclone. 8vo, pp. 20.

From 'Blackwood's Magazine,' August, 1892.

Oberhammer, Eugen.—Der Berg des heiligen Kreuzes auf Cypern. Das Ausland LXV. (1892): 304-306, 380-383, 394-397, 407-410.

Description of Mount Santa Croce, in Cyprus.

Euge [Dr.], W.—Beiträge zur Geographie von Kleinasien. *Petermann Mitteilungen*, XXXVIII., 1892: 225-231.

A contribution to the geography of Asia Minor, including a journey from Brussa to Smyrna and Chios, with maps.

Sundermann, H.—Neue Beiträge zur Ethnographie von Nias. *Das Ausland* LXV. (1892), 577-581, 598-604, 616-620.

An account of the literature of the Nias islanders, with vocabularies and translations in German.

[Valle, Pietro della.]—The Travels of Pietro della Valle in India. From the Old English Translation of 1664, by G. Havers. Edited, with a Life of the Author, an Introduction, and Notes, by Edward Grey. 2 vols. *Hakluyt Society Publications*, Nos. LXXXIV. and LXXXV. London, 1892: 8vo, pp. 454, map, plan, and portrait. [Presented by the Hakluyt Society.]

AFRICA.

Alia, Harry [Hyppolite Percher].—A la Conquête du Tchad. Paris, Hachette & Co., 1891: large 8vo, pp. 296, maps and illustrations.

Baratieri, O.—La Regione tra l'Anseba ed il Barca. *Bollettino della Società Geografica Italiana* [3], V. (1892): 418-422.

Topographical sketch of the country lying between Habab and Beni Am including the valley of the Anseba, with a map.

Binger [Capt.].—Esclavage, Islamisme, et Christianisme. Paris, 1891: 8 pp. 112. Price 2s.

Bottego, V.—Nella Terra dei Danakil. *Bollettino della Società Geografica Italiana* [3], V. (1892): 403-418, 480-494.

Journal of a journey by Captain Böttego from Massawa to Assab by land with illustrations, a map, zoological notes, and meteorological observations.

Bricchetti-Robecchi, Luigi.—Testi nelle Lingue Harar e Galla. *Rendiconti della Reale Accademia dei Lincei. Classe di Scienze Morali, Storiche, &c.* Ser. Vol. I., 254-263.

Specimens of the languages of Harar and the Gallas, with Italian translations.

[Cape of Good Hope.]—Results of a Census of the Colony of the Cape of Good Hope, as on the night of Sunday, April 5th, 1891. Cape Town, 1892: folio pp. cxxxi. and 486. [Presented by the Colonial Secretary, Cape Town, through H. de Smidt, Director of the Census.]

In this volume statistics are grouped under the following heads, viz. Population and Dwellings, Birthplaces, Religions, Ages, Education, Conjugal Condition, Occupations, Sickness and Infirmities, Convicts and Prisoners, Live Stock and Agriculture. There are also several Supplementary Tables, besides a General Report on the whole. A series of coloured diagrams are given at the end of the volume.

Carson, Alexander.—The Rise and Fall of Lake Tanganyika. *Quarterly Journal of Geological Society*, XLVIII. (1892): 401-403.

Chabaud, Marius.—*La Réunion et Madagascar.* *Revue Française*, XVII. (1892): pp. 49-58.

Summarises the present position of Réunion, Diego Suarez, Tamatave, and Antananarivo from the point of view of French interests.

Chelu, A.—*Le Nil, le Soudan, l'Égypte.* Paris, Chaix, 1891: 4to, pp. vii. and 507. Illustrations.

M. Chelu, formerly chief engineer for the Egyptian Sudan, here sums up his studies of the hydrology of the River Nile, illustrating his description with numerous fine maps and innumerable statistical tables. The cataracts are described in detail, with a discussion of their physical cause and their economic results. A large part of the work is devoted to the question of irrigation, and to the agricultural capabilities of Egypt. As a scientific book of reference the volume must take a high place, the more so as it is remarkably free from mere expressions of opinion.

Deschamps, Léon.—*Histoire de la Question Coloniale en France.* Paris, E. Plon, Nourrit & Co., 1891: 8vo, pp. xvi. and 105.

Dove [Dr.], K. *Niederschlagsmengen am Kap der Guten Hoffnung.* Pp. . [Presented by the Author.]

A discussion of the rainfall statistics of the Cape Town district. Reprinted, from Petermann's *Mittheilungen* (1892): 167-170.

Duprey, R.—*Geography of Mauritius, for use in Schools and Colleges.* Port Louis, R. Ollivry & Co., 1892: 12mo, pp. 103. [Presented by the Author.]

Contains a map of Mauritius, showing the district boundaries, the main and public roads, the rivers and their principal branches, the mountains, villages, &c., and the railways, with the new junction line.

Durham, F. A.—*The Lone-Star of Liberia: being the Outcome of Reflections on our own People.* London, Elliot Stock, 1892: 8vo, pp. xxiv. and 331. Price 6s. [Presented by the Publisher.]

The title is misleading if it suggests the idea of a geographical work. Only a few pages refer to the Republic of Liberia.

Ellerbeck, J. H. T.—*A Guide to the Canary Islands, calling at Madeira.* London, G. Philip & Son [1892]: 12mo, pp. 67. Price 3s. [Presented by the Publishers.]

In the present little guide more detailed notices are given of many places which in older guides are merely mentioned casually. It contains a number of maps, which have been recently corrected, and new tracks added, while the plans of towns and illustrations are in themselves a useful feature.

Engler, H.—*Ueber die Hochgebirgsflora des tropischen Afrika.* Large 4to, pp. 461. Published in the *Abhandlungen der Akademie der Wissenschaften zu Berlin*, 1891. Berlin, 1892.

An exhaustive account of the mountain flora of Africa, treating of the Abyssinian, Masai, Somali, Kamerun, and Angola districts, with a discussion of the relations between the African flora and that of other regions, and a systematic catalogue—which occupies the bulk of the memoir—giving the places, elevations, and authorities of all African mountain plants.

[**Italian East Africa.**]—*Documenti Diplomatici presentati al Parlamento Italiano.* Missione Antonelli in Etiopia. Roma, 1891: 4to, pp. vi. and 102.

Jackson, James.—*Socotra, Notes Bibliographiques.* Paris, Delagrave, 1892: 8vo, pp. 40. [Presented by the Author.]

This valuable compendium of the literature of Socotra, which has been appearing in the *Revue de Géographie*, is now published in a separate form. It is, like all M. Jackson's bibliographical work, complete and ready of reference.

Jaime [Lieut.], G.—*De Koulikoro à Tombouctou à bord du 'Mage,' 1889-1890* Paris, E. Dentu [1892]: pp. 436, maps and illustrations.

Lieutenant Jaime prepared to set out on the gunboat 'Mage' to map the Niger between Timbuktu and Say, but at the last moment the instructions were recalled, and his expedition from Koulikoro limited to the Port of Timbuktu; the special object of the mission being to enter into friendly relations with the people of the upper reaches of the river. Koulikoro was reached from St. Louis by proceeding up the Senegal in a sailing boat, which had to be towed most of the way against the current to Kayes. Thence a railway leads to Bafoulabé, a distance of 80 miles; but the line is so bad that the locomotive requires the assistance of a swarm of natives to pull the train along. The rest of the journey to Koulikoro had to be done on foot. Two gunboats went down the Niger on this expedition, and many interesting notes on the scenery and native tribes are recorded. Unfortunately the Touaregs proved hostile, and after several encounters, when Koulikoro was reached it was considered unsafe, with the small number of men fit to proceed, for the officers to complete their journey of 10 miles on land to Timbuktu itself, so that the title of the book is applicable rather to the intention than to the accomplishment of the journey.

Jeppe, F.—*Die Feststellung der Grenze zwischen der Südafrikanischen Republik (Transvaal) und der portugiesischen Besitzungen in der Südküste von Afrika.* Petermann's Mittheilungen, XXXVIII. (1892): 120-134.

Particulars of the work of the Portuguese and Transvaal Commissioners in settling the frontier of their territories in South Africa.

Mizon, L.—*De Niger au Congo par l'Adamaoua, 1890-1892.* Bulletin Soc. de Géog. Comm. de Paris, XIV. (1892): 257-272.

M. Mizon's address to the Paris Society of Commercial Geography, with a map of his route from the Niger, up the Binné, and down the Sangha to the Congo.

Rolland, Georges.—*Géologie du Sahara Algérien et Aperçu géologique sur le Sahara de l'Océan Atlantique à la Mer Rouge.* Paris, Imprimerie Nationale, 1890: large 4to, pp. 276. Numerous maps and plates.

The geological and hydrological results of the preliminary survey for a railway across the Sahara.

Sabatier, Camille.—*Touat, Sahara, et Soudan: Étude Géographique, Politique, Economique et Militaire.* Paris, Société d'Éditions Scientifiques, 1891: 8vo, pp. 336. Price 6 fr.

Contains a good map of the Central and Southern Sahara, showing density of population.

Scott [Rev.], D. C.—*A Cyclopædic Dictionary of the Mang'anya Language spoken in British Central Africa.* Edinburgh: Printed for the Foreign Mission Committee of the Church of Scotland, 1892; cr. 8vo, pp. xxii. and 737. [Presented by Dr. R. N. Cust.]

The Mang'anya form part of the great river and lake branch of the Bantu race. They are related more closely to the Zulu, Kallir, and Congo tribes

than they are to the Coast tribes. Mr. Scott's work appears to have been very effectively carried out; it must prove most useful to pioneers in Central Africa and to philologists at home. It is perhaps the most complete philological treatise on a Bantu language which has yet appeared.

Tiedeman, Adolf von.—Tana—Baringo—Nil. Mit Karl Peters zu Emin Pascha. Berlin: Walther und Apolant, 1892: 8vo, pp. 332.

This volume contains extracts from the diary kept by the author on the German Emin Pasha Relief Expedition, as well as letters written home. The illustrations are from his own sketches.

Vignon, Louis.—L'Expansion de la France. Paris, Guillaumin & Co., 1891: 12mo, pp. x. and 379. Price, 3 fr. 50c.

Volz [Dr.], B.—Unsere Kolonien: Land und Leute. Leipzig, F. A. Brockhaus, 1891: 8vo, pp. x. and 369, maps and illustrations.

Vossion, Louis.—Les Provinces Égyptiennes du Soudan et de l'Équateur. Le Commerce de l'Ivoire à Khartoum et au Soudan Égyptien. Paris, Challamel Aîné, 1892: 8vo, pp. 20. [Presented by the Author.]

Young, Robert.—Trophies from African Heathenism. London, Hodder and Stoughton, 1892: cr. 8vo, pp. xii. and 218. Price 3s. 6d. [Presented by the Publishers.]

Contains an account of the progress made by the missionaries of the Free Church of Scotland in South Africa, citing instances of true Christianity among the converts. A good map of South Africa, showing the mission stations of the various churches, illustrates the volume.

AMERICA.

[America.]—Travelling Naturalists in the New World. Quarterly Review, CLXXV. (1892): 445–475.

A pleasant commentary on the travels and work of Edwards, Bates, Wallace, Belt, and Hudson.

American Ephemeris and Nautical Almanac for the Year 1895.—First edition. Washington, 1892: large 8vo, pp. 532, charts.

Balod, C.—Der Staat Santa Catharina in Südbrasilien. Das Ausland, LXV. (1892): 427–429, 441–446, 458–462, 476–478, 490–493, 504–510.

Detailed topography, climatology, plant and animal geography, and description of natural resources of the State of Sta. Catharina, in Brazil.

Bendire [Capt.], Charles.—Life Histories of North American Birds, with special reference to their Breeding Habits and Eggs. Vol. XXVIII. of the Smithsonian Contributions to Knowledge. Washington, 1892: 4to, pp. x. and 416. Twelve plates. [Presented by the Smithsonian Institution.]

Brackebusch [Prof.], L.—Eine neue Karte der Argentinischen Republik im Massstabe von 1:1,000,000. Petermann's Mitteilungen, XXXVIII. (1892): 178–189.

Discussion of the data on which the map was constructed, with tables of positions.

[Canada.]—The Maritime Provinces of Canada, Nova Scotia, New Brunswick Prince Edward Island. Fourteen illustrations and map. Published under the authority of the Canadian Government, 1892: 8vo, pp. 122. [Presented by Sir Charles Tupper.]

A handbook of general information, with special reference to the agricultural and other resources of the Maritime Provinces of Canada. It includes the report of Mr. Thomas Davey, the former delegate from England to the Maritime Provinces, an extract from a paper by Dr. Fream, letters from residents in the Provinces, together with statistical and other information, and a chapter containing advice to intending emigrants.

Johnston, Thomas Crawford.—Did the Phœnicians discover America? *Geographical Society of California Special Bulletin*, 1892: 8vo, pp. 30.

Speculations based on the cyclopean remains of Polynesia, viewed as link between Assyrian and Egyptian sculpture and the stone monuments of Mexico.

Monet, Henri.—Martinique. Paris, A. Savine, 1891: 8vo, pp. 411.

An account of the hurricanes of 1891, with historical notes of previous hurricanes in Martinique.

Prida y Arteaga, F. de.—La Mexique, tel qu'il est aujourd'hui. Paris, A. Savine, 1891: 8vo, pp. xv. and 376. Portraits and maps.

This book gives a brief historical account of Mexico in the nineteenth century, a statement of the present state of affairs in that country, including the administration, public works, &c., and a concise summary of each of the federated states of the republic, mainly with regard to their commercial resources.

Sapper [Dr.], Karl.—Am See von Yzabel, Guatemala. *Petermann's Mittheilungen*, XXXVIII. (1892).

A visit to Lake Yzabel, in Central America, in 1890.

Seovell, J. T.—The Elevation of Mount Orizaba, or Citlaltépetl. *American Naturalist*, XXVI. (1892): pp. 842-844.

A new measurement, giving the height as 18,300 feet.

Stanton, R. B.—Availability of the Cañons of the Colorado River of the West for Railway Purposes. With Discussion. *Trans. American Soc. of Civil Engineers*. No. 523. (Vol. XXVI., April, 1892): 8vo, map and plates. [Presented by the Author.]

[United States.]—The Methods and Results of the Survey of the West Coast of Lower California, by the Officers of the U.S.S. *Ranger*, during the Season of 1889 and 1890. Washington, 1892: 8vo, pp. 237. Plates. [Presented by the U.S. Hydrographer.]

The object of this work is not merely to report the progress of the survey, but to place on record the processes and precautions which experience has taught to be essential to accurate work under the special conditions of the coast survey. Numerous illustrations of instruments and the way of using them, and charts showing the whole process, from the first triangulation to the finished map, are added. The important features in which the coast-survey maps are in advance of the British Ordnance Survey are well shown in the specimen sheet copied in the book. Contour lines on land are given, combined with very effective hill-shading, while the ordinary features of a hydrographic chart occupy the water surface.

Wyse, Lucien N.-B.—Rapport Général sur le Canal Interocéanique de Panama. Paris, Achille Heymann, 1891: 4to, pp. 154, and map.

A contribution to the official literature of the ill-fated Panama Canal.

AUSTRALASIA.

Collingridge, George.—The Early Discovery of Australia. With thirteen maps. Proc. Roy. Geog. Soc. Australasia (Sydney), V. (1892): 97-116, 120-123.

A criticism of the evidence as to the period of the discovery of Australia, the author identifying the continent with the *Java Major* of early European maps.

Gray, Roderick.—Tongariro, the Sacred Mountain of the Maori. London, Digby, Long & Co. [n. d.]: 12mo, pp. viii. and 49. Price 1s. [Presented by the Author.]

A descriptive account of Tongariro, by one who has resided on the volcano for many years.

Holtze, Maurice.—Narrative of an Exploring Tour across Melville Island, with Notes on its Botany. Trans. Roy. Soc. South Australia, XV. 1892: 114-120.

King [Hon.], Philip G.—Comments on Cook's Log (H.M.S. *Endeavour*, 1770), with extracts. Charts and sketches. Sydney: Printed by Authority, 1891: 4to, pp. 30. [Presented by the Author.]

The official log of Cook's voyage while he was exploring the east coast of Australia is here presented, with comments in the form of a continuous narrative. An appendix recalls the fact that Port Jackson was named after one of the Secretaries to the Admiralty who subsequently changed his name to Duckett, thus giving occasion to the common belief that the harbour was named after one of Cook's sailors.

OCEANIA.

Lièvre, D.—Honolulu et l'Île d'Oahu. Bulletin Soc. Géog. Comm. de Paris, XIV. (1892): 254-308.

Notes on Hawaii.

Remy, Jules.—Ascension de MM. Brenebley et Remy au Maunakea, Polynésie. Extrait du Journal de M. Jules Remy. Châlons-sur-Marne: Imp. Martin Frères, 1892: 8vo, pp. 45. [Presented by M. Jules Remy.]

ARCTIC REGIONS.

Drygalski [Dr.], Erich von.—Grönlands Gletscher und Inlandeis. Berlin, 1892: 8vo, pp. 62. Plates. [Presented by the Author.] Extracted from the Zeitschrift of the Berlin Geographical Society, Vol. XXVII., 1892.

It contains a description of the inland ice, the ice fjords, glaciers, and icebergs, with extremely valuable photographs of glacial phenomena. These researches of Dr. Drygalski were preliminary to the exhaustive series of observations now in progress.

GENERAL.

Becher [Capt.], A. B.—Navigation of the Atlantic Ocean. Winds, Weather and Currents. Fifth edition. London, J. D. Potter: 8vo, pp. 192. Maps. Price 6s. [Presented by the Publishers.]

Clyde, James.—Elementary Geography. With Appendix on Sacred Geography, and five coloured maps. Twenty-fifth edition. Edinburgh, Oliver and Boyd; London, Simpkin, Marshall & Co., 1892: 12mo, pp. 195.

This well-known 'Elementary Geography' of the old school has been subjected to a very extensive revision for the present edition, the characteristic of which is the prominence given to the industries and commerce of the world, particularly in their relations to the British Isles and Colonies.

(Goochet) [Le frère], Alexia.—*Histoire Élémentaire de la Géographie*. Bulletin Société Royale de Géographie d'Anvers, XVI. (1892): 343-424.

Reprint of an elementary history of geography written for Belgian schools, giving prominence to the pioneering work of Roman Catholic missionaries.

Guppy, H. B.—The River Thames as an Agent in Plant-Dispersal. Journal of the Linnean Society, XXIX. (1892, Botany): 333-346.

A summary was published in the 'Proceedings' for November, p. 798.

Hammer, E.—Zur Projektion der Erdkarte in 1: 1,000,000. Das Ausland, LXV. (1892): 625-631.

A criticism on Penck's proposed map.

Krebs, Wilhelm.—Klimatische Faktoren der Weltwirtschaft. Das Ausland, LXV. (1892): 465-469, 482-487.

Climatic conditions with reference to productivity in natural resources are considered specially for Japan and the German possessions in Africa.

Lapworth [Prof.], C.—Address to the Geological Section of the British Association, 1892. Birmingham, 1892: 8vo, pp. 18. [Presented by the Author.]

The substance of this address has been published in the 'Proceedings' for October, pp. 688-697.

Levasseur, —.—Note sur la Méthode d'enseignement de la Géographie. Extrait du Compte Rendu du V^e Congrès International des Sciences Géographiques. 8vo, pp. 32.

Mathiesen [General], H.—Étude sur les Courants et sur la Température des Eaux de la Mer dans l'Océan Atlantique. Christiania, S. Larpent, 1892: 4to, pp. 66. Diagrams and map. [Presented by the Author.]

This study is founded mainly on the work of Maury and other early oceanographers; and as it does not profess to discuss the results of the *Challenger* and other oceanic expeditions, nor the more detailed work of the United States Coast Survey, and of the Norwegian North Atlantic Expedition, the conclusions arrived at cannot be accepted as the outcome of recent observations. General Mathiesen formulates a theory of oceanic circulation founded mainly on the position of the isotherms at various seasons; and he denies the possibility of any of the permanent ocean currents being due to wind, the effect of which he considers to be merely transient pseudo-currents.

[Mission Reports].—Free Church of Scotland. Missionary Reports (Foreign), 1891-92.

Record of mission work in India, South Africa, Melanesia, Syria, Arabia, and elsewhere.

Panckow, Hellmuth.—Ueber Zwergvölker in Afrika und Süd Asien. Zeitschrift der Gesellschaft für Erdkunde zu Berlin, XXVII. (1892): 75-120.

A comprehensive discussion of the distribution of dwarf tribes in Africa and India.

Partsch, J.—Die Entwicklung der historischen Länderkunde und ihre Stellung im Gesamtgebiete der Geographie. Das Ausland, XLV. (1892): 401-403, 417-420.

Discussing the place of historical conditions in the field of geography.

[Royal Colonial Institute].—Proceedings of the Royal Colonial Institute. Vol. XXIII., 1891-92. London, 1892: 8vo, pp. vi. and 476, frontispiece. [Presented by the Institute.]

Among the more important papers contained in this volume may be mentioned those dealing with "The Malay Peninsula; its Resources and Prospects,"

by W. E. Maxwell, C.M.G.; "British Columbia; a Problem of Colonial Development," by Rev. Canon Beanlands; "Ceylon; its Attractions to Visitors and Settlers," by John Ferguson; "Mashonaland, and its Development," by E. A. Maund; "New Zealand," by Westby B. Perceval; "The West Indies in 1892," by the Rt. Hon. Lord Brassey, K.C.B.

[**Russian Charts.**].—Lecture des Cartes Russes. Signes conventionnels. Annales Hydrographiques, No. 731 (1892), 27-43.

Useful notes for reading Russian charts, abstracted from Menchikov's "Guide pour la lecture des cartes russes et étrangères."

Smith [Dr.], George.—Henry Martyn, Saint and Scholar. First Modern Missionary to the Mohammedans, 1781-1812. With portrait and illustrations. London, The Religious Tract Society, 1892: large cr. 8vo, pp. xii. and 380. Price 10s. 6d. [Presented by the Religious Tract Society.]

Dr. Smith, by utilising the voluminous correspondence between Henry Martyn and Lydia Granfell, which was practically ignored in earlier biographies, has made this life of an intrepid pioneer in mission work a deeply interesting romance of real life. Martyn's work in India from 1805 to 1810 as an army chaplain, and his subsequent experience in Persia and the Turkish empire, are told with great sympathy and in perfect taste.

Tissandier, Albert.—Voyage au Tour du Monde: Inde et Ceylon—Chine et Japon, 1887-1890-1891. Paris, G. Masson, 1892: 4to, pp. 298. Illustrations. Price 25fr.

The value of this work rests chiefly on the numerous beautifully-executed illustrations by the author. His attention was mainly directed to temples, statues, and other objects of archaeological interest; and most of the space is devoted to India, Ceylon, China, and Japan, the voyage out by the Suez Canal, and the journey home by the Canadian Pacific Railway, being only alluded to.

Umlauf [Dr.], Friedrich.—Die Bevölkerungsdichte der Erde. Deutsche Rundschau für Geographie, XV. (1892): 34-36.

A short article accompanying a map of Density of Population, in which the results of the various censuses of 1890 and 1891 are incorporated.

Whitney [Prof.], Milton.—Some Physical Properties of Soils in their relation to Moisture and Crop Distribution. Washington Weather Bureau, 1892 (Bulletin No. 4): 8vo, pp. 90. [Presented by the Weather Bureau.]

A valuable contribution to our knowledge of the properties of soil in relation to plant life. Details of the soils of Maryland and South Carolina are given, and the relation of these to the crops they bear worked out. The relation of vegetation to soil over the globe is no less important from the geographical than from the economic point of view.

Wisotzki, Emil.—Die Strömungen in den Meerestraszen. Das Ausland, LXX. (1892), 449-452, 470-472, 487-489, 500-504, 518-520, 538-541, 554-558 565-571.

An important contribution to the history of physical geography, dealing with the opinions and observations of the currents in straits from the earliest times.

Wohltmann [Dr.], F.—Die natürlichen Faktoren der Tropischen Agrikultur und die Merkmale ihrer Bourtung. Leipzig, Duncker und Humblot, 1892: 8vo, pp. xxi. and 440.

This is the first volume of a systematic treatise on agriculture in the tropics. The second and third chapters are the most interesting from a geographical point of view. The author discusses the "natural basis of tropical and sub-tropical

agriculture." The atmospheric conditions are considered, and the extent of their influence in the tropics and the temperate zone respectively carefully compared. The nature of the soil is next discussed, the physical and chemical properties of soils peculiar to the tropics being considered in turn. In the third chapter the author treats of the natural products of the tropics, and their significance in estimating the agricultural capabilities of any particular region. The fourth chapter contains a short bibliography, but is chiefly of a technical nature, dealing with the conditions most favourable to the cultivation of those plants and the breeding of those animals which form the staple of tropical agriculture.

The following works have also been added to the Library :—

Africa.—[Royal African Company, Various Pamphlets Relating to the.]—1667–1718 : maps, sm. 4to.

[**Australasia.**]—Cassell's Picturesque Australasia. Edited by E. E. Morris, M.A. London, &c., Cassell & Co., 1889–90 : 4to, pp. (Vol. I.) viii. and 310; (Vol. II.) viii. and 309; (Vol. III.) viii. and 309; (Vol. IV.) viii. and 308.

The chief features of the above volumes of Cassell's "Picturesque Series" are the number and excellence of the illustrations, which, aided by a carefully-compiled text, give a good idea of the physical characteristics of the countries and places described.

Blümcke, Kurt. Der Aufstand in Deutsch-Ostafrika und seine Niederwerfung, im nördlichen Theil mit einem Nachwort über die Deutsche und die Englische. Emin Pascha Expedition. Berlin, A. Tonger : large 8vo, pp. 96, map. Price 2s.

Choffat, Paul, and Loriol, P. de.—Matériaux pour l'Étude Stratigraphique et Paléontologique de la Province d'Angola.—Mémoires de la Soc. de Physique et d'Histoire Naturelle de Genève. Tome XXX; No. 2. Geneva, H. Georg, 1888 : 4to, pp. 116, plates.

Demay, Charles.—Histoire de la Colonisation Allemande. Paris, C. Bayle, 1889 : 12mo, pp. 215.

[**Europe.**]—Picturesque Europe, 5 vols. London, &c., Cassell & Co. : 4to, pp. (Vol. I.) xii. and 288; (Vol. II.) ix. and 288; (Vol. III.) ix. and 288; (Vol. IV.) ix. and 288; (Vol. V.) ix., 288 and 32.

[**Geography.**]—The Compleat Geographer, or, the Chorography and Topography of all the known parts of the Earth. To which is prefixed an Introduction to Geography, and a Natural History of the Earth and the Elements. Fourth edition. London, 1723 : folio, pp. li. 402 and 288, maps.

[**Great Britain.**]—The Rivers of Great Britain; Descriptive, Historical, Pictorial. London, &c., Cassell & Co., 1889 : 4to, pp. vii. and 376.

This volume is devoted to a description of the rivers of the East Coast, including the Dee, the Tay, the Forth, the Tweed, the Coquet, the Tyne, the Wear, the Tees, the Humber and its tributaries, the rivers of the Wash, and the rivers of East Anglia. The magnificent illustrations with which the volume is embellished, are a noteworthy feature, and add greatly to its value and importance.

[**Mediterranean.**]—The Picturesque Mediterranean. 2 vols. London, &c., Cassell & Co., 1890–91 : 4to, pp. (Vol. I.) vii. and 280; (Vol. II.) viii. and 288.

Neves, J. A. Das.—Considerações politicas, e commerciaes sobre os descobrimentos, e possessões dos Portuguezes na Africa, e na Asia. Lisboa, 1830 : 12mo, pp. 420.

Roscher, Wilhelm, and Jannasch, Robert.—Kolonien, Kolonialpolitik, und Auswanderung. Leipzig, C. F. Winter, 1885: 8vo, pp vi. and 469.

Sarmiento, Afonso de Moraes.—Chemin de fer du Zambèze. Projet de Afonso de Moraes Sarmiento, Capitaine du Génie. [Lisbonne, 1889]: 4to, map and plate.

NEW MAPS.

(By J. COLES, *Map Curator, &c.*)

EUROPE.

France.—Carte de —, gravée par le Service Géographique de l'Armée. Scale 1:200,000, or 2·7 geographical miles to an inch. Sheet 31, Angers. Paris, Dépôt de la Guerre. Price 1s. 6d. (*Dulau.*)

London.—Stanford's Contoured Map of the County of —. Scale 1:21,120, or 3·45 inches to a geographical mile. London, E. Stanford, 1892. [Presented by the Publisher.]

In this map contour-lines are drawn at 25-feet intervals, the lowest contour being 25 feet above the level of the Ordnance Survey datum, which is 12 feet 6 inches below Trinity High Water. All the land below the lowest contour is coloured with a darker shade of brown than the rest. The map is intended to be hung on a wall, and the contours have been drawn with that end in view. The light is supposed to come from the north-west angle of the map, thus leaving all the south and east contours in shadow. It contains much general information that will be useful for reference, such as the boundaries of the County of London, School-Board districts, positions of public buildings, means of communication, &c.

Oesterreich-Ungar Monarchie.—Neue hypsometrische Karte von der —. Scale 1:750,000, or 10·3 geographical miles to an inch. To be completed in 25 sheets. Price 2s. each. (*Dulau.*)

ORDNANCE SURVEY MAPS.

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(*Stanford, Agent.*)

ASIA.

Ceylon.—Topographical Map of the Island of —. Scale 1: 283,310, or 3'4" geographical miles to an inch. Sheets 3, 8, and 10. Surveyor-General's Office Colombo. [Presented by the Surveyor-General of Ceylon.]

Indian Government Surveys:—

Lower Burma Survey, 1 inch to a mile. Sheet No. 45, District Akyab Seasons 1883-87. 181 (2nd edition), Districts Henzada, Tharrawaddy, and Prome. Seasons 1882 to 1888. 227, Districts Prome, Tharrawaddy, and Toungoo Seasons 1882-83, and 1884 to 1889.—North-Eastern Frontier. 4 miles to an inch. No. 14 S.E. Parts of Districts Sibsagar, Naga Hills, Naga Tribe (Assam), and of Singpho-Naga Hills. Seasons 1862 to 1872, 1873 to 1876, and 1887-88. 15 S.E. (3rd edition), Parts of Manipur (Assam), and of District Upper Chindwin (Upper Burma), and Wuntho (Shan States). Seasons 1881-85 and 1886 to 88. 15 N.E., Parts of Manipur (Assam), and Upper Chindwin (Upper Burma), Season 1885-86. 23 N.W. (5th edition), Part of District Bhamo (Upper Burma). Seasons 1888-91.—South-Eastern Frontier. 4 miles to an inch. 1 N.W., Parts of Chittagong, Hill Tracts, Hill Tipperah (Bengal), Lusha Hills, and Chin Hills (Upper Burma). Seasons 1861 to 1891. 3 N.E. (3rd edition), Parts of Districts Minbu, Magwe, and Pyinmana (Upper Burma), and Thayetmyo, Prome, and Toungoo (Lower Burma). Seasons 1885 to 1887 and 1890-91. 4 N.W. (4th edition), Parts of Katha, Bhamo, Ruby Mines and Shwebo Districts, and North Shan States (Upper Burma). Seasons 1886 to 1891 4 N.E. (3rd edition), Part of Shan State of North Theinni (Senwi). Season 1887-91. 4 S.W. (5th edition), Parts of Ruby Mines, Momeit (Mong Myit) Shwebo, Sagaing, and Mandalay Districts (Upper Burma), and Shan States of Thibaw (Sipaw), Yatsauk (Loksok), Maingkaing (Mong-Kong), Maington (Mong ton), North and South Theinni (Senwi), Taungbaing (Loi Long), and Kyith Bansam. Seasons 1886 to 1891. 5 S.W. (5th edition), Parts of Meiktila Yamethin, and Pyinmana Districts, and South Shan States (Upper Burma) Seasons 1886-91.—South-Eastern Frontier. 1 inch to 8 miles. 1 (3rd edition), Parts of the Lushai and Chin Hills, of Wuntho (Shan State), and the Districts of Upper and Lower Chindwin, Katha, Shwebo, Yeu, Pakokku, Sagaing, and Mandalay (Upper Burma); of Northern Arakan (Lower Burma); of the District and Hill Tracts of Chittagong, and of Hill Tipperah (Bengal). 3 A. (preliminary edition), Districts Bassein and Thongwa, and Parts of Sandoway, Henzada Tharrawaddy, and Hanthawaddy (Lower Burma). 7 (Preliminary edition) Parts of Districts Shwegyin, Amberst, Salween, Tharrawaddy, Thongwa, Pegu and Hanthawaddy (Lower Burma), and Part of the Kingdom of Siam.—Map to illustrate Report on Frontier Expedition, 1890-91. 1 inch to 8 miles.—Reconnaissance Survey of the Route followed by Lieut. Daly's Party toward the China Frontier, 1890-91. 1 inch to 4 miles.—Astor and Gilgit, with surrounding country. 1 inch to 4 miles. 1892.—Preliminary issue. Meharanzai Expedition, 1890-91. Map of Khanki Valley. 1 inch to 1 mile 2 sheets.—Great Trigonometrical Survey of India. Levels in the North-West Provinces. Sheet No. 6, Parts of Meerut, Bijnor, Muzaffarnagar, Moradabad Kumaun, Garhwál, and Tarai. 1 inch to 2 miles.—North-East Longitudinal Series. 1 inch to 4 miles. Charts Nos. 1 A., 1 B., 3, 4.—The Provinces of Bengal, Behar, Orissa, and Chota Nagpore. 1 inch to 16 miles. 2 sheets, corrections to August, 1891.—Road Map of the Punjab, showing Ferries, Serais, Dak Bungalows, Encamping Grounds, and Roads, 1879. 16 miles to an inch. With additions to railways to May, 1891. 2 sheets.—The North-Western

Provinces, showing the Districts and States under the jurisdiction of the Lieut.-Governor, with the adjoining Province of Oudh. 1 inch to 16 miles. Third edition. With additions and corrections up to March, 1891. 4 sheets.—The North-West Provinces and Oudh, under the jurisdiction of the Lieut.-Governor, with the adjoining Province of Oudh. 1 inch to 16 miles. Third edition. With additions and corrections up to March, 1891. 4 sheets.—The North-West Provinces and Oudh, under the jurisdiction of the Lieut.-Governor. Corrected to March 31st, 1891. 1 inch to 32 miles.—The Central Provinces. 16 miles to an inch. 1881. With additions to 1891. 2 sheets.—District Bankoora, Bengal. 1 inch to 8 miles. 1889.—Berar. 1 inch to 24 miles. 1892.—Bengal, District Chittagong. 1 inch to 8 miles. 1889.—District Cuttack, Bengal. 1 inch to 8 miles. 1890.—District Durbhunga, Bengal. 1 inch to 8 miles. 1891.—Index to the Standard Sheets of Bengal, Feb., 1892. [Presented by H. M. Secretary of State for India, through the India Office.]

Sumatra.—Kart van —, Bangka en de Riouw-Lingga Archipel, 12 Bladen op 1:1,000,000, or 13·6 geographical miles to an inch. Door Dr. I. Dornseiffen en E. de Geest. Amsterdam, Seyffardt's Boekhandel. Price 18s. 6d. (*Dulau*).

This is a twelve-sheet map of Sumatra, and has been compiled from official documents and the latest surveys. Special attention has been paid to the spelling of the names, the orthography having been revised by Mr. L. K. Harmsen.

AFRICA.

Algérie.—Carte Géologique Provisoire de l' —. Deuxième édition unifiée, corrigée et complétée par le Service Géologique de l'Algérie. Étant Directeurs du Service; M. Pomet, Directeur de l'École Supérieure des Sciences d'Alger, Membre Correspondant de l'Institut; et M. Pouyane, Ingénieur en Chef des Mines à Alger. Scale 1:800,000, or 11 geographical miles to an inch. With explanatory letterpress. Price, mounted, with letterpress, 18s. (*Dulau*).

—(Département d'Oran). Carte publiée par le Service Géographique de l'Armée. Scale 1:50,000, or 1·4 inches to a geographical mile. Paris, Dépôt de la Guerre. Sheet 210, Oued-Imbert. Price 1s. 6d. (*Dulau*).

Bartholomew, J. G., F.R.G.S.—Central and South Africa, by J. G. Bartholomew, F.R.G.S. Scale 1:5,600,000, or 76·7 geographical miles to an inch. The Edinburgh Geographical Institute, J. Bartholomew & Co., 1892. Price 2s. [Presented by Messrs. J. Bartholomew & Co.]

This is a new edition of Bartholomew's map of Central and South Africa, on which all the boundaries of European possessions, and the spheres of influence are accurately laid down. The railways, with the exception of the line from St. Paul de Loanda to Ambaca, have been brought up to date, and insets are given of the mouths of the Zambesi River, Port Natal, Lorenzo Marques, Port Elizabeth, and Cape Town, with the surrounding country. A map of England and Wales, on the same scale as the large map, is also given. The map is drawn in a very clear style; crowding with names has been avoided, and the scale is sufficiently large for all purposes of general reference.

Service Géographique de l'Armée.—Afrique. Scale 1:8,000,000, or 109·2 geographical miles to an inch. Sheet 4, Equatorial Lake Region, &c. Service Géographique de l'Armée, Paris. Price 1s. 6d. [Presented by the Service Géographique de l'Armée, Paris.]

This is the first sheet of a new map and has been most carefully compiled, and promises to be one of the most reliable maps of Africa published. It is printed in colours—the lakes and rivers in blue, and the hill-shading in brown.

All trade routes and boundaries of spheres of influence are shown, and the lettering is remarkably clear.

South Africa.—Juta's Enlarged Map of —, from the Cape to the Zambesi. Compiled from the best available Colonial and Imperial Information, including the Official Cape Colony Map, by the Surveyor-General, Cape Town, Dr. T. Hahn's Damaraland, and F. C. Selous' Journals and Sketches, &c. Scale 1:1,901,600, or 26·05 geographical miles to an inch. Published by J. C. Juta & Co., Cape Town. London, Edward Stanford, 1891. 4 sheets. [Presented by E. Stanford, Esq.]

Tunisie.—Carte de la —, publiée par le Service Géographique de l'Armée. Scale 1:50,000, or 1·4 inches to a geographical mile. Sheets 12, Matteur; 30, Nabeul. Price 1s. 6d. each sheet. (*Dulaud*.)

CHARTS.

Admiralty.—Charts and plans published by the Hydrographic Department, Admiralty, in September and October, 1892.

No.		Inches.	
2290	m =	6·0	England, south coast:—Exmouth Harbour. 2s.
777	m =	1·0	England, south and west coasts:—St. Agnes Head to Gerrans Bay, including the approaches to Falmouth, Penzance, and St. Ives. 2s. 6d.
2007	m =	6·0	Scotland, west coast:—River Clyde, from Dumbarton to Glasgow. (<i>Republished</i> .) 2s. 6d.
2379	m =	1·4	Black Sea:—Kherson or Dniepr Bay. 2s. 6d.
1151	m =	4·0	North America, east coast, Labrador:—Chateau Bay. 1s. 6d.
1678	{ m = m =	{ 3·5 1·07	{ Newfoundland, north-east coast:—Southern approach to Hare Bay, Four and Little Islets Harbours. 2s. 6d.
1137	m =	3·0	North America, east coast, Labrador:—Bradore Bay. 1s. 6d.
396	m =	0·07	Central America:—Cape la Vela to Chagres, with the southern coast, showing the Gulf of Panama. 2s. 6d.
1301	m =	Various	South America, west coast:—Plans of the Coast of Chili. Carrisal Bajo Bay. Constitucion Harbour. Mejillones del Sur Bay. Cobija Bay, or Puerto la Mar. Copper or Gatico Cove. Tocopilla Road. 2s.
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776	m =	1·0	China Sea, Tong King Gulf:—Shieng Mun to Tra Ko Island, including the interior channels and off-lying islands. 2s. 6d.
1429	m =	0·83	China, east coast:—Nimrod Sound to Yung River, including the southern portion of the Chusan Archipelago. 2s. 6d.
1736	m =	5·0	South Pacific, New Hebrides:—Port Sandwich. 1s. 6d.
55	— —	—	Anchorage in New Britain and New Ireland:—Plans added, Herbertahoh. Hatsfeldt Harbour.

(*J. D. Potter, Agent.*)

CHARTS CANCELLED.

No.		Cancelled by	No.
2290	Exmouth Harbour	New plan. Exmouth Harbour	2290
2379	Kherson, or Dniepr Bay	{ New plan. Kherson or Dniepr Bay	2379
1151	Chateau Bay	New plan. Chateau Bay ..	1151
279	Plans of Four and Pettites Ilettes Harbour, Fichot Harbour, on this sheet	{ New plan. Southern approaches to Hare Bay	1678
282	Plan of La Source Bay, on this chart		
1137	Bradore Bay and Harbour	New plan. Bradore Bay ..	1137
396	Cape la Vela to Cayos Ratones ..	{ New chart. Cape la Vela to Chagres	396
1579	Cayos Ratones to San Juan de Nicaragua		
1276	Plan of Port Carrizal Bajo, on this chart	{ New plans. Plans on the Coast of Chile	1301
1277	Plans of Angamos Point Anchorage and Mejillones del Sur Bay, on this chart		
1593	Silam Harbour	New plan. Silam Harbour ..	1593
1429	Chusan Archipelago	{ New plan. Nimrod Sound ..	1429
1770	Kintang Channel		
1736	Plan of Port Sandwich, on this sheet	New plan. Port Sandwich ..	1736
2026	Port Patrick.		
1301	Cobija Bay. Algodon Ales Bay. Constitucion Harbour.		
1480	Yang-tse-kiang, from the sea to Nanking.		

CHARTS THAT HAVE RECEIVED IMPORTANT CORRECTIONS.

No. 2006, Scotland, west coast:—River Clyde from Greenock to Dumbarton. 2308, Norway:—Sheet 6, Brand Fjord to Lekö. 1104, France, west coast:—Bay of Biscay. 2680, France, north coast:—Entrance of the Seine. 2613, France, north coast:—Sheet 11, Barfleur to Cape D'Antifer. 2612, France, north coast:—Sheet 12, Trouville to Dieppe. 1679, Mediterranean:—Harbours and Anchorages in the Archipelago. 2001, South America, east coast:—Monte Video Bay. 2402, Malacca Strait:—Durian, Moro, and Jambul Straits. 2403, Malacca Strait:—Singapore Roads. 1789, Malacca Strait:—Channels between Sumatra and Linga, Sinkep, &c. 2757, Eastern Archipelago:—Banka Strait to Singapore. 952, Japan:—Owasi Bay to Takamatsu no Saki. 2766, New Guinea:—North-east coast of New Guinea. 764, South Pacific:—New Hanover, New Ireland, and New Britain. 1570, South Pacific, New Hebrides Islands:—Malo Island to Efate Island.
(*J. D. Potter, Agent.*)

North Atlantic Ocean.—Pilot Chart of the —. November, 1892. With Supplement on "The Hurricane of November 21st–23th, 1888, off the Atlantic Coast of the United States." Published at the Hydrographic Office, Bureau of Navigation, Navy Department, Washington, D.C. [Presented by the United States Hydrographer.]

ATLASES.

Atlas Antiquus.—Justus Perthes' —. Pocket-Atlas of the Ancient World, by Dr. Alb. van Kampen. 24 Copper-plate maps, coloured; with an Index. Gotha: Justus Perthes. London: Dulau & Co. 1893. Price 3s.

Owing to the favourable reception which Justus Perthes' "Pocket-Atlas" has met with, the publishers have now issued a similarly convenient atlas relating to ancient history. It contains twenty-four maps of ancient geography, and an index containing 7000 names, in which, besides the place-names and descriptive abbreviations, the name of the district is also given. A supplementary index is furnished, in which the names selected by van Kampen in the 'Tabula Peutingeriana' are alphabetically enumerated. The maps, which are far superior to those which are generally given in works of this class, have been engraved on copper and coloured by hand.

Johnston, W. & A. K.—Royal Atlas of Modern Geography. Edition in monthly parts. Parts XIII. and XIV. W. & A. K. Johnston, Edinburgh and London. 1892. Price 4s. 6d. each part. [Presented by the Publishers.]

These parts contain maps of Sweden and Norway, the Baltic Sea, North Atlantic Ocean, and New Zealand, with an inset of New Guinea.

Levasseur, Émile.—Grand Atlas de Géographie, Physique et Politique. Par Émile Levasseur, Membre de l'Institut. Paris: Librairie Ch. Delagrave, Editeur. Parts 4 to 12. Price 4s. each. (Dulau.)

This atlas is now complete, and contains 160 principal maps and 330 insets. The maps are both political and physical, and as a whole form a very useful atlas for reference.

Meyers-Kleiner Hand-Atlas.—Mit Benutzung des Kartenmaterials aus Meyers Konversations-Lexikon zusammengestellt in 100 Kartenblättern und 8 Textbeilagen. Leipzig und Wien. Verlag des Bibliographischen Instituts. 1892. Parts 2 to 17. Price 6d. each. (Williams and Norgate.)

This atlas is now complete, and contains 100 principal maps, eight of which are accompanied by indices. On the majority of the maps the physical features are very well shown, and the clear style in which they all are drawn might be copied with advantage by more pretentious works.

Vidal-Lablache.—Histoire et Géographie. 137 Cartes, 248 Cartons. Atlas Vidal-Lablache, Maître de Conférences de Géographie à l'École Normale Supérieure. Paris: Armand Colin et Cie., Editeurs. Parts 5 to 16. Price 1s. 2d. each. (Dulau.)

This atlas will be complete in 24 parts.

Universal Atlas.—The —. Complete in 28 parts, including Index. Published by Cassell & Co., Limited, London, for the Atlas Publishing Company, Limited. Part XX. Price 1s. each part. [Presented by the Publishers.]

PHOTOGRAPHS.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

CAPTAIN LUGARD'S MAP OF PART OF UGANDA AND THE NEIGHBOURING COUNTRIES.*

THE materials which were placed in my hands for the purpose of compiling a map illustrative of Captain Lugard's paper, consisted of a series of charts on which Captain Lugard had plotted his routes, on a scale of about 1 : 250,000, two route-books, and eight volumes of diaries. I had also Captain Williams's map of the route into Unyoro. Captain Lugard had done his plotting out in Africa, and almost from day to day, whilst the objects he saw were still fresh in his mind. His itineraries are based upon compass bearings, and distances estimated with the aid of a very serviceable "trade-watch." His charts are patterns of what such things should be; and, in addition to routes and bearings, they contain voluminous notes on the character of the country through which he passed. I tested his work with the aid of the route-books, and found that the plotting had been done most conscientiously. The circuits closed satisfactorily, and altogether great credit is due to Captain Lugard for having produced such a mass of useful cartographical material, notwithstanding his slender outfit as a surveyor, and the time he was necessarily compelled to devote to numerous other duties. The altitudes were roughly determined with the aid of a small aneroid, and are merely approximative.

In my attempt to combine Captain Lugard's itineraries into a consistent whole, and to bring them into accord with what had been observed by previous explorers, I started from Kavalli, on the Albert Nyanza, and the position assigned to that place by Colonel Mason, viz., lat. $1^{\circ} 22' 3''$ N., long. $30^{\circ} 30' 2''$ E. (see 'Proceedings,' 1889, p. 646). I found, to my very great satisfaction, that by accepting this position, and utilising the observations of Mr. H. M. Stanley† and Captain Lugard, I was enabled to lay down the country, up to Mr. Stanley's camp, with a tolerable amount of confidence. I thus obtained the following positions:—

Nsabe, $1^{\circ} 27' N.$, $30^{\circ} 31' 9'' E.$, by D. R.

Stanley's Camp, to the west of Kasenyi (Kavalli's) island, $1^{\circ} 19' 1'' N.$, $30^{\circ} 29' E.$ (as observed by Mr. Stanley)

Camp below Bundi, $1^{\circ} 25' 6'' N.$, as observed by Mr. Stanley, $30^{\circ} 24' 8'' E.$, by D. R.

Pass whence Mr. Stanley first descended to the lake, $1^{\circ} 20' N.$, $30^{\circ} 23' 4'' E.$, by D. R.

Stanley's Camp (Kavalli) $1^{\circ} 30' 3'' N.$, $30^{\circ} 22' 5'' E.$, by D. R. (the longitude absolutely agrees with that determined by Mr. Stanley on January 31, 1889; his mean of two observations being, however, $30^{\circ} 10' 5'' E.$).

Mazamboui's in Usuduma, $1^{\circ} 25' 4'' N.$ (according to Mr. Stanley's and Dr. Stuhlmann's concordant observations), $30^{\circ} 11' E.$

These assigned positions are borne out by the following, among other bearings,† viz:—

Bundi village bears 280° from a point half-way between Nsabe and Badzwa (Stanley).

The Pass whence Mr. Stanley first descended to the lake bears 289° from Mr.

* To be inserted at end of 'Proceedings,' Royal Geographical Society, for 1892.

† Mr. H. M. Stanley placed the whole of his MS. diaries, as also his original maps and records of astronomical observations, at my service. They contain a mass of information which has never been adequately utilized in the construction of a map, those accompanying Mr. Stanley's work being on far too small a scale to exhibit all the details which he has collected.

‡ All bearings, as here given, are magnetic. In plotting them I have throughout applied a westerly variation of 10° . These bearings are taken from Captain Lugard's maps and diaries, unless the contrary is stated.

Stanley's camp near Keeseni Island, and 263° from his camp near Mason's Kavalli. The island, on Masaka's map, bears E.S.E. (112°) from this pass (Stanley). Masaka's Peak bears 257° from Stanley's camp (Kavalli).

Nsabe had been placed by Mr. Stanley in lat. $1^{\circ} 30' 2''$ N. I have shifted it to $1^{\circ} 27' N.$, and my justification for doing so is to be found in the following bearings noted in Mr. Stanley's diary, viz., Mwar Point 55° , Hoga Point $83\frac{1}{2}^{\circ}$, a waterfall to the north of the Masi River, 158° .

A considerable number of long distance bearings were available for laying down Captain Lugard's routes between Mr. Stanley's camp and Katwe, on the Albert Edward, viz:—

MR. STANLEY'S CAMP to Ruwenzori Peaks, 210° and 206° ; another more distant peak, detached (not identified) 261° (Stanley).

Nsabe to Mount Agil, 228° (Stanley). This bearing fairly well suits Captain Lugard's "Point of Range." No mountain exists in the position assigned to Mount Agil on Mr. Stanley's map.

Half-way between Nsabe and Badzwa: Ruwenzori, 215° (Stanley).

"Point of Range" ($1^{\circ} 5' 3'' N.$, $30^{\circ} 20' E.$): Kinya, 14° , a point marked 2500, S.E. of Dukala's, 15° ; Fort N. of Dukala's, 26° .

Njombe ($0^{\circ} 48' N.$, $30^{\circ} 27' E.$): Snow Peaks, 242 245° .

From near VJONGO CORNER ($0^{\circ} 38' N.$, $30^{\circ} 17' E.$) Kiriba (Snow Peaks, 233° ; Musanga, 40°).

From 1 m N.W. of NYAKORONGO ($0^{\circ} 35' 5'' N.$, $30^{\circ} 31' 3'' E.$): Kivari Peak, 188° ; VJONGO-CORNER (supposed, but according to plotting Iwinda Peak, 301° ; Nsumo, 346°).

MOUNT LADABA ($0^{\circ} 14' 5'' N.$, $30^{\circ} 35' 3'' E.$): Buariba, 8° ; Ibanda Village, 162° ; Bukarongu, 228° ; Chikaya, 230° ; Kina, 282° ; Butanuku, 318° ; a point S. of Butindi ($5550'$), 332° ; Kivari, 318° .

PORT EDWARD ($0^{\circ} 16' N.$, $30^{\circ} 13' 75'' E.$): Kivari Hill, 86° ; point beyond crossing over Wini, on road to Kivari, 96° ; Chikaya, 132° ; a point $1\frac{1}{2}$ m N.W. of Nara, 113° ; Ruwenzori, 161° ; Kiriba (or Snow Peak), 321° .

NKESKE MOUNT, 1 m S. of Fort Edward, Buariba, 73° .

Ferry over MUKKI, S.E. of Fort Edward: Kivari Hill, 84° .

On SABAWE, below Fort Edward: Kiriba (Snow Peak), 327° ; Kakula (Snow Peak), 297° .

KATWE ($0^{\circ} 11' S.$, $30^{\circ} 1' 5'' E.$): Snow Peak (Kiriba?), 17° ; Bunyuruguru Peak, 140° .

These bearings, which leave but a few gaps filled up by the itinerary, satisfied me that, for the present at all events, I might allow Katwe to remain in the position assigned to it by Mr. Stanley's observations for latitude and longitude. Whether "Kiriba" is to be understood to refer to an individual peak, I am unable to decide. The "Gordon Bennett" of Mr. Stanley's first journey appears to be identical with the Ruwenzori, for Gambarazara is undoubtedly identical with Toru, whose King Nyika has been deposed by Kabrega of Unyoro, since Mr. Stanley's visit, and whose son, Kasaguma, has recently been reinstated by Captain Lugard, and now resides at Fort Edward. The "Gordon Bennett" of Mr. Stanley's later map appears, however, to be identical with the Kyatwa, whilst the "Mackinnon" may be the Nyamsika. As to the "Edwin Arnold" there can be no doubt as to its being the Lobaba.

Captain Lugard's excursion to Emin's Camp has been laid down in absolute accordance with his itinerary, as plotted by himself. The latitude of the camp ($0^{\circ} 17' 3'' N.$) agrees with Mr. Stanley's map.

The observed latitudes and longitudes accepted for laying down the route from Kampala to Katwe, are the following:—

Kampala, $19^{\circ} 30' N.$, $32^{\circ} 34' 30'' E.$ (Captain Pringle).

Magola (Jumba's village), $4^{\circ} 29' S.$ (Pearson).

Masaka, $20' S.$ (Speke).

Mr. Stanley's "Buzimba" camp, which Captain Lugard discovered at Bwera, to the south of Fort Grant, $0^{\circ} 9' 31'' S.$ (Stanley).

The principal bearings have been inserted upon the map. Birinzi depends upon Masaka, which bore 266° , and Baja, which bore 357° . Kituntu occupies the position in latitude assigned to it by Captain Speke.

The final results are as follows :—

Captain Lugard's Maps.				Adopted.	
		G.M.	Bearing.	G.M.	Bearing.
Kampala to Ntinzi	43	on	255°	41	on $293\frac{1}{2}^{\circ}$.
Ntinzi to Masaka	23	"	$224\frac{1}{2}^{\circ}$	21	" 224° .
Masaka to Bwera (Buzimba) ..	80	"	275°	75	" 279° .
Bwera to Katwe	84	"	271°	81	" 272° .
Katwe to Mr. Stanley's camp ..	109	"	$14\frac{1}{2}^{\circ}$	101	" $12\frac{1}{2}^{\circ}$.

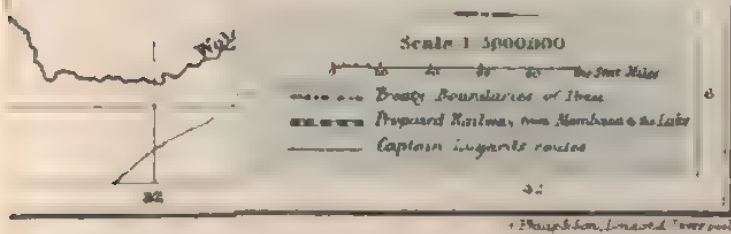
Information from other explorers has been introduced sparingly. Dr. Junker, on going from Kabrega's capital to Rubaga, followed the same route as Captain Lugard. His map has been published in 'Petermann's Mittheilungen,' 1891, Tafel I. of Dr. Stuhlmann's recent journeys preliminary maps have been published in the "Mittheilungen aus den Deutschen Schutzgebieten" V. 1892, Tafel 8; and 'Petermann's Mittheilungen,' 1892, Tafel 16. Mr. Mackay's Diaries enabled me to improve the delineation of the Sese Archipelago. Of my indebtedness to Mr. Stanley I have already spoken.

E. G. RAVENSTEIN.

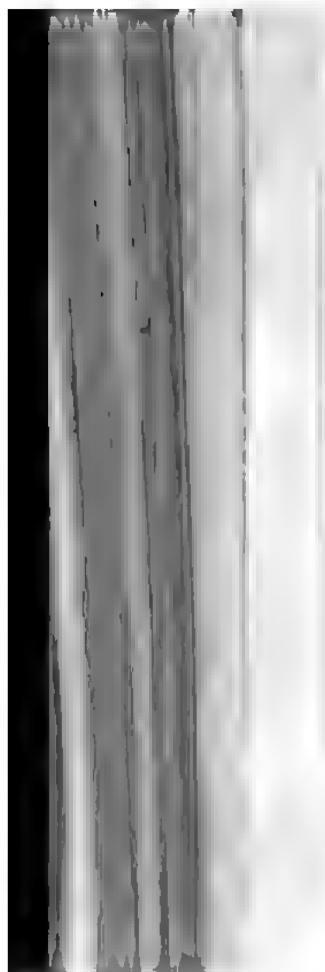
1. The first part of the document is a list of the names of the persons who were present at the meeting.

2. The second part of the document is a list of the names of the persons who were absent from the meeting.

3. The third part of the document is a list of the names of the persons who were present at the meeting.



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